

AFIT/GIR/LAS/99D-7

AN ANALYSIS OF TRAINING ADEQUACY
AND ADDITIONAL TRAINING REQUIREMENTS
AS PERCEIVED BY COMMUNICATIONS AND
INFORMATION OFFICERS

THESIS

Rex W. Little, Captain, USAF

AFIT/GIR/LAS/99D-7

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THESIS

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Degree of Master of Science in Information Resource Management

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Rex W. Little

Table of Contents

Acknowledgements.....	iii
List of Figures	vi
List of Tables	vii
Abstract	ix
I - Introduction	1
Background	1
Purpose of Study	5
Investigative Questions	6
Scope of Research	7
Definitions of Terms	7
Assumptions	8
Organization of Thesis	8
II – Literature Review	10
Introduction	10
Training Requirements for Communications and Information officers	10
Current Training	11
Professional Military Education	13
Communications and Information Career Field Training	25
Optional Training	29
Other DoD Training Programs and Initiatives	36
Summary	47
Conclusion	49
III - Methodology	50
Overview	50
Relevant Population	50
Data Collection Method	51
Survey Development and Testing	52
Required Sample Size	54
Sample Selection	55
Survey Administration	56
Data Analysis Procedures	58

IV - Data Analysis	59
Introduction.....	59
Demographic Information.....	59
Summary of Demographic Information.....	67
Questionnaire Results	67
Part III - Training Background	67
Summary - Part III	70
Part IV - General Training Perceptions	71
Summary - Part IV	75
Part V - When to Receive Training.....	76
Summary - Part V	81
Part VI - Need for Additional Training/Continuing Education	82
Summary - Part VI.....	88
Part VII - Current Training/Continuing Education Assessment.....	89
Summary - Part VII.....	90
V - Conclusions, Recommendations, and	91
Suggestions for Future Research	91
Introduction.....	91
Conclusions.....	92
Recommendations.....	95
Suggestions for Further Research	96
Conclusion	98
Appendix A - Survey	99
Appendix B - Response Rate Data.....	107
Bibliography	108
Vita.....	113

List of Figures

1. Communications and Information Career Path Pyramid.....	12
2. Air War College Curriculum.....	23
3. Rank Distribution.....	60
4. Time in Service by Rank.....	62
5. Time in Career Field by Rank.....	63
6. Previously in IM Career Field.....	64
7. Perceived Training Need for Programming Languages.....	84
8. Perceived Training Need for Operating systems and OS Tools.....	85
9. Perceived Training Need for Information and System Security.....	85
10. Perceived Training Need for Corporate Data Architecture.....	86
11. Perceived Training Need for Acquisition and Contracting.....	87
12. Perceived Training Need for Counseling.....	88
13. Evaluation of Current Career Field Training/Education System.....	89

List of Tables

1. SOS-R Academic Credit Recommendation.....	16
2. SOS-NR Academic Credit Recommendation.....	17
3. AWC Contact Hours.....	24
4. AWC Academic Credit Recommendation.....	24
5. BCOT Curriculum.....	26
6. AFIT PCE Software Professional Development Program.....	35
7. Communications-Computer Systems Acquisition Personnel Career Progression.....	37
8. DAU Curriculum Transition Timeframe.....	38
9. Curriculum Delivery Advantages/Disadvantages.....	41
10. Current Distance Learning Courses.....	42
11. AFDLO Curriculum Transition Timeframe.....	43
12. Communications and Information Officer Rank Distribution.....	51
13. Bulk Delivery Bases.....	56
14. Survey Rejects.....	57
15. Rank Representation.....	61
16. Time in Service.....	61
17. Time in Career Field.....	63
18. Education Level.....	65
19. BCOT Attendance.....	65
20. ACOT Attendance.....	66
21. AFIT Master's Program Participation.....	66

22. DoD CBTs Taken.....	68
23. Commercial CBTs Taken.....	68
24. Distance Learning Courses Taken.....	69
25. Commercial Classroom Courses Taken.....	69
26. Number of Military Classroom Courses Taken.....	70
27. Need for Training between BCOT and ACOT.....	71
28. Need for Additional Training after ACOT.....	72
29. Need for Training to be Tracked.....	73
30. Should Training/Continuing Education be Mandatory?.....	73
31. Acceptance of ADSC for Desired Training.....	74
32. Knowledge of Available CBT Training.....	74
33. When to Receive Training for Technical Specialties.....	76
34. When to Receive Training for Technology Management.....	78
35. When to Receive Training for Interpersonal Skills.....	80
36. When to Receive Training for Information Operations.....	81
37. Perception of Additional Training Needs.....	83

Abstract

This study explores requirements for additional training Communications and Information officers. This research also looks at the best time to provide training/education in the identified training deficient areas. Training areas and categories were established by two previous theses and were modified by a group of field experts for this research.

The following questions were posed in an effort to obtain the perception of officers in the field: (1) What training areas do Communications and information officers feel are deficient? (2) At what point during a Communications and Information officer's career would it be most appropriate to receive training in necessary areas? (3) What is the best way to incorporate additionally needed training into the existing training system?

The results suggest that Air Force officers in this career field find the training to be satisfactory at best, with several training deficiencies in the multiple areas. The findings also show that officers would prefer to receive additional training either at the beginning of their career, or on a Just-in-Time/recurring basis.

The results of this thesis show that improvements in training are necessary, and should emphasize both the beginning of an officer's career as well as Just-in-Time training that can be used "anytime/anywhere."

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I - Introduction

Background

Every executive and senior manager knows that our information capabilities – the combination of computing power and communication links – have radically changed the world. It's also clear the information age is transforming all military operations by providing commanders with information that is unprecedented both in terms of quality and quantity. (Fogleman, 1996)

Information technology (IT) is advancing at a pace never experienced in history. As the requirements for information managers change due to this rapidly evolving environment, it is imperative that Air Force personnel working as Communications and Information Officers acquire and maintain the appropriate skills. In “Evolution of a Species,” James Martin wrote about the increasing value of the “best professionals” as IT increases in its power to change business (Martin, 1995:37). Creating a work force that has the necessary skills to meet the information demands of an organization as large and diverse as the Air Force can pose many problems.

The current Communications and Information career field training system will be significantly challenged by future training requirements, because those requirements are rapidly changing (Schmidt, 1997:2). They change not only because of advancement in

the fields of computers and communications, but also because of dynamics within the Air Force and the career field. The manning in the Air Force has consistently dropped for the last 10 years. The number of line officers such as those working in the Communications and Information career field dropped by 35% between 1989 and 1998 (AFPC Personnel Statistics Web Site, 1999). The career field is currently only at a 67% manning level, meaning qualified officers in this career field are at a premium.

The significance of changes within the information environment becomes evident when reviewing research that is six or seven years old. While a study performed Biros & Cole (1992) looked at part of the current career field, it still provides valuable information about the qualifications that college graduates possessed in the early '90s. This thesis is only seven years old, but the differences in qualification expectations from then to now is startling. The population of the study comprised Air Force Information Management officers who were already working in that capacity. Since one must have at least an undergraduate degree prior to commissioning, we can assume officers attending the IM course have achieved that level of education.

The 1992 study's first conclusion, "These results seem to indicate the course needs to be further restructured for a better understanding of word processors (p. 79)," is clearly outdated. The fact that the people taking the survey in 1991-1992 probably went to college in the late Eighties helps us to better understand why they might have had minimal exposure to word processors prior to their Air Force training. The respondents

were asked to identify their level of familiarity with a variety of terms, some of which were:

- Microcomputer
- Floppy Diskette
- Hardware
- Operating System
- Software
- Word Processing
- Spreadsheet
- Database
- Electronic Mail
- Local Area Network (LAN)

A high school student might be expected to know these terms today, yet the Air Force was training college graduates to be familiar with them just seven years ago. Currently, information resources and technologies are changing at a staggering rate. Today, all Communications and Information officers would be expected to be more familiar with the term LAN or email. As information has become more and more important to the military's ability to control air and space, "Information Dominance", the power to gain, exploit, defend and attack information, has become a core competency of the Air Force (Dudney, 1997:24). According to the former Chief of Staff, Ronald R. Fogleman, "To achieve success in the 21st Century, we will rely more and more on our ability to use and protect our information technology" (1996). This acknowledgement is a long way from expecting our information warriors to be familiar with the terms "floppy disk" or "spreadsheet."

In September 1993, the Air Force established the Air Force Warfare Center at Kelly AFB, in San Antonio, Texas. Two years later, on 1 October 1995, the Air Force created the first information warfare squadron, the 609th at Shaw Air Force Base, a unit

totally focused on information warfare (Air Force Issues Book, 1997:1). It has become obvious that we must now prepare for a battle for information supremacy.

It has often been observed that there has been an explosion in the availability of information. The problem faced now is not access to information, but rather its overabundance. The challenge is to winnow what is useful out of the vast amount of information available: to select, evaluate, describe, store, retrieve, manipulate and present relevant information (Varian, 1996:12). In an effort to adapt to this changing information environment, the Air Force has merged the Information Management career field with the Communication Computer career field. With a population numbering over 4000, the resulting career field, Communications and Information, is the largest non-pilot officer career field in the Air Force (AFPC Personnel Statistics Web Site, 1999). Information Managers cannot function without knowledge of the information systems that so often hold us all hostage. While information and computer technologies once seemed to be an unnecessary coupling, the two have become two halves of the same coin.

A second change that just took place was the removal of specialization from the career field. Where in the past, the Air Force identified members with training in programming or analysis, they will no longer provide and track this specialized training (Seidl, 1998). Whether an officer is destined to be a programmer, oversee contract development, be an instructor, an executive officer, or be in charge of the base network, he will be identified with the same career designation. This career field modification adds another variable to the already complex information training requirements that the Air Force must meet.

Training individuals for requirements that change as rapidly as those in the areas of communications and information can seem an impossible task. Complicating this task is the fact information technology is growing and becoming more complex almost daily. Trying to determine whether to focus on the information or the information technology is a debate that is still raging in Management Information Systems, Computer Information Systems, Information Systems, Information Resource Management and a host of other similar disciplines across the nation.

The Air Force is a unique institution that cannot always look to the private sector for solutions when trying to improve business practices, but training issues in the area of information technology are also the concern of the commercial industry. The question of technical expertise, both creating it and maintaining it, is hardly just an Air Force problem. Jobs are constantly changing and continuing education is now a reality in many private companies (Smith, 1994:14). Almost every large organization in corporate America is struggling with the best way to solve this problem. The vast amount of research being done in the field and academic institutions across the country will aid greatly in working towards solutions in this area.

Purpose of Study

This research will question present Communications and Information (33SX) officers to find their perceptions regarding training needs that exist having participated in the standard training system. The purpose of this study is also to determine when respondents feel the optimal time is to accomplish necessary additional training. As a result, this study will determine if there are specific areas of education and knowledge

which current Communications and Information training did not satisfy. Some evidence already suggests that officers in this career field may be lacking the proper educational foundation and knowledge base to accomplish the newly defined Communications and Information officer functions. For example, Schmidt (1997) found that many junior officers were not comfortable or confident in their jobs as a result of the Air Force's initial training program for the career field, Basic Communications and Information Officer Training (Schmidt, 1997:82-83).

Investigative Questions

The following investigative questions are proposed to address the research topic and accomplish the specific objective:

1. What training areas do Communications and Information officers feel are deficient within the current career field training system?
2. If additional training is needed, at what point during a Communications and Information officer's career would it be most appropriate to receive training in necessary areas?
3. If additional training is needed, what is the best way to incorporate the additionally needed training into the training system that exists for Communications and Information officers?

The information obtained by answering these questions will assist the Air Force in assessing the current and future Air Force Communications and Information officer training system and benefit officers' professional development in this career field.

Scope of Research

The scope of this study is limited to all Air Force Communications and Information officers that have been commissioned for at least four years. Communications and Information officers that are relatively new to the career field (i.e., less than four years), will not be included in the study. While some studies in the past have concentrated on groups other than the students themselves (Phillips, 1998), this one will rely on the individuals who actually attended the training to assess it's success in satisfying the necessary training requirements. The thesis completed by Schmidt in 1997 looked at what areas were important to know for information resource managers, but did not look at how well existing training satisfied those needs.

Definitions of Terms

Information technology has become centrally important to strategic change in higher education, and there is now a critical interdependence between the way higher education is organized and the way information technology is deployed (Ward, 1994:23). Since the changes in technology are evolving rapidly, it stands to reason that its effects on education are also changing quickly. The following definitions are provided and explain terms that are used throughout the thesis:

Distance Learning (DL) - Any formal approach to learning in which the majority of the instruction occurs while the educator and learner are at a distance from each other (Grimes, 1993:6).

Computer Based Training (CBT) - Computers provide active learning as programs (software) present information, or simulate situations (Kemp and Cochern, 1994:53).

Other common terms used for this kind of training are interactive courseware (ICW), computer aided instruction (CAI) and computer based instruction (CBI).

Web-Based Training - Courses delivered partly or completely via the Internet, an intranet or an extranet (Stuart, 1999).

Assumptions

This study builds on the previous work of Biros and Cole (1992), Schmidt (1997) and Phillips (1998). It will use the core skills presented by Schmidt in his AFIT thesis as a starting point when questioning about the needed skills in the field. It assumes this skill set is not overly outdated, and can serve as a solid beginning point for the core skills required at the present time.

Organization of Thesis

Chapter I provides an overview of the research effort. It includes the background information necessary to understand the specific research questions while providing the motivation of the importance and value of the study. It specifies the specific objective, the investigative questions, the scope of the research and the assumptions made in order to conduct such a study.

Chapter II is a review of the pertinent and current literature involved in this study. The existing Communications and Information training system will be reviewed, as well as the training systems used by other military organizations.

Chapter III describes the methodology used in answering the specific objectives and investigative questions. It will also outline the method used for data analysis.

Chapter IV is the analysis of the data collected from the survey accomplished by the participants. First, the demographics of the study are presented. Next, the data assessing which courses are required, despite the current training system. Finally, the study will look at when respondents feel the most appropriate time for training in each of the neglected subjects. Finally, Chapter V presents the findings of the study. Conclusions and recommendations are discussed based on the analyzed data.

II – Literature Review

Introduction

This literature review presents information about the various types of training that are available to the Air Force both from within the organization as well as through outsourcing. It is important to understand while reading the following pages that the Air Force currently utilizes both internal training systems as well as training supplied by 3rd party vendors (e.g. Oracle, Learning Tree). It would not be reasonable to think that one kind of training will solve all the needs of an organization, especially one as large and diverse as the Air Force. The literature presented will help delve into the pros and cons of each type of training solution in order to learn which types of training are available and which might be best suited to solve different problems. This literature review will also cover technology enabled training techniques that are being used in increasing numbers to solve the training requirements of several organizations.

Training Requirements for Communications and Information officers

Communications and Information officers work in the area of information technology and management. There are several different academic disciplines in this area that teach many of the same classes. The work done by Biros and Cole (1992) looked at the requirements of information managers (IM). The subsequent work of Schmidt (1997) and Phillips (1998) looked at the requirements of information resource managers (IRM) when assessing Communications and Information officers. It would be possible to create training and education requirements using MIS curricula or that of an IS or CIS program. The research done by both Schmidt (1997) and Phillips (1998) is

quite extensive and establishes a baseline of several required training areas that are broken down into three major categories, technical specialties, technology management, and interpersonal skills. The theses of Schmidt and Phillips also show that interpersonal skills are the overall area that is most needed by Communications and Information officers.

The goal of this research is not to determine what training Communications and Information officers need to receive: that has already been done by the recent work of Schmidt and Phillips. Both Schmidt (1997) and Phillips (1998) have outlined research in the MIS academic domain on skills needed for IS professionals. The interested reader is referred to those studies for extensive background and literature on the topic. The primary goal of this research is to identify possible deficiencies in the existing training relative to the requirements identified in the aforementioned research. This literature review will instead focus on all the training that is available to officers in this career field, and assess if that training is satisfying the previously determined training requirements. The research will also pay particular attention to available modalities with the current available Air Force training, since that will weigh in determinations of training dynamics.

Current Training

An Air Force Communications and Information officer is exposed to three general categories of training. Training that all Air Force officers participate in, regardless of career type, is called professional military education (PME). This education is intended to foster skills such as officership, communication, and teamwork that are required by all officers, regardless of which specific job or career field they possess. This education is

Professional Military Education

PME is an integral part of the training that an Air Force officer undertakes. While this training is not going to cover the technical aspects of the career field, many of the interpersonal skills will be covered at some level in these schools. Since Schmidt (1997) and Phillips (1998) determined that interpersonal skills are the most important skill set that a Communications and Information officer can possess, it is important to look at the PME institutions and see if they are attempting to satisfy part of this training requirement. There is also benefit in finding out what training modalities are being used by these Air Force institutions, so it is possible to see what officers in the career field are being exposed to. This training helps introduce and reinforce the culture of the Air Force. Stanley M. Davis said "A well-articulated and internalized set of shared beliefs is crucial for linking the technological inventiveness to a vision that all members of a corporation can identify with, and from which all members derive meaning from their work that is larger than themselves and their paycheck. This is a very important function of corporate culture" (1984:122). While his statement rings true in the civilian sector, it is even more critical in the unique military environment. Davis goes on to explain that a common thread among great organizations seems to be a very high moral and social standards that are built into their corporate cultural.

The Air Education and Training Command (AETC) conduct Air Force PME. The AETC was created in July of 1993 when the two existing training commands merged to create one command responsible for all major training programs in the Air Force (AETC Fact Sheet). Air Force PME courses are located at Maxwell Air Force Base in

Montgomery, Alabama. The PME courses most officers take consist of the Aerospace Basic Course, Squadron Officer School, Air Command and Staff College and Air War College. Some PME courses provide Distance Learning alternatives to in-residence participation.

Aerospace Basic Course. The Aerospace Basic Course (ABC) is the new first step in Air Force officer professional military education. Air Force senior leaders chartered the concept for ABC in 1996; ABC was activated in the fall of 1997. During the summer of 1998, ABC tested its concept by putting 312 newly commissioned officers and civilians through the course. Senior leaders approved the course with a desire to put 100 percent of new Air Force officers through the program. Lieutenant General Lance W. Lord, Air University commander, expects ABC to make young officers “absolute masters of the profession of arms and, specifically, aerospace power” (Air Force Online News, 1999). The objective is to help new Air Force officers comprehend their roles as airmen who understand and live by Air Force core values. They must be able to articulate and demonstrate the service’s core competencies, and display the dedication as Air Force warriors it takes to accomplish today’s Air Force mission. The ABC curriculum focuses on issues such as aerospace theory, doctrine and strategy; current and future aerospace systems and capabilities; and planning and executing joint aerospace operations. Values and ethic principles are interwoven throughout the four-week course. The course culminates with “Operation Blue Thunder,” a four-day exercise in which students produce a joint aerospace operations plan and run a wing operations center and an air operations center. To run the wing operations center part of Blue Thunder, students “deploy” to a tent city built on Maxwell specifically for that purpose. This

capstone exercise demonstrates to the student the teamwork required to successfully plan a joint AeroSpace campaign. The Aerospace Basic Course is only a resident course (Air Force Online News, 1999).

Squadron Officer School. Squadron Officer School (SOS), the second course in the Air Force officer PME system, traces its roots to the Air Tactical School founded in 1946 at Tyndall Field, Florida. To be eligible for the SOS resident (SOS-R) program, an officer must be a captain with at least four and less than seven years commissioned service. Starting in 2000, there will be seven five-week classes per year with approximately 520 students each.

The mission of SOS is to improve the professional competence of company grade officers and inspire their dedication to the profession of arms. While at SOS-R, officers leave their specialties behind and broaden their focus on the Air Force's core values, and on the Air Force as an institution in the profession of arms. SOS-R is a school that attempts not only to improve leadership skills, but the skills of following as well. The school also provides an opportunity to refine written and oral communication skills as well as laying the foundation for critical thinking regarding both air and space power. The four defined areas of study, Officership Values, Officership Application, Leadership Tools, and Air and Space Power, are presented concurrently rather than sequentially. This technique is incorporated to emphasize their close interrelationship. Readings, lectures, seminars, and field exercises support each other to provide in-depth coverage of the subject areas (SOS Resident Curriculum, 1999).

The Center for Adult Learning and Educational Credentials of the American Council on Education recommends awarding the following academic credits for completing SOS-R.

Table 1. SOS-R Academic Credit Recommendation

Subject	Level	Hours
Leadership/managerial human relations	Graduate	3 semester hours
Managerial Communications	Upper-Division	3 semester hours
National security studies and military strategy	Upper-Division	3 semester hours

Source: SOS Academic Credit Recommendation, 1999

The SOS Nonresident Program (SOS-NR) parallels the resident program and comes in both a paper format or on CD-ROM. The CD-ROM version was activated on 13 January 1997 and contains the same material as the paper version. The program is made up of four courses, Officership, Staff Communications, Leadership, and Force Employment. While the eligibility requirements still mandate a minimum rank of Captain, there is no seven-year commissioned time limit, nor is the course restricted to Captains. This allows officers who were unable to attend SOS-R to take SOS-NR once their eligibility for the resident course expires. The Nonresident program allows a total of 18 months for completion, a 12 month academic time schedule and an additional six months to help offset current operation tempos, possible temporary duty requirements, reassignments, and administrative processing.

Upon enrollment in SOS-NR, the Extension Course Institute (ECI) at Maxwell AFB, Alabama mails the entire correspondence program directly to the student at their home address. The ECI mails required tests to the Test Control Office (TCO), where the tests will be administered once the student is ready. Students who fail a test are permitted one retake, provided the retake is successfully completed within the 18-month time limit.

After a failed test, the student should receive a card to let them know what areas showed difficulty on the test. If a student is eliminated from the program, either by choice, multiple test failures, or not completing the course in the allotted 18 month time limit, he/she enters a restriction period of 6 months during which he/she is unable to enroll in any PME course. Upon reentering the program, students start back at the beginning and receive no credit for prior work. Test scores, test failures, or course elimination is not maintained in personnel records. Program completion is the only event recorded in official records (SOS Non-Resident Curriculum, 1999).

The Center for Adult Learning and Educational Credentials of the American Council on Education recommends awarding the following academic credit for completing SOS-R.

Table 2. SOS-NR Academic Credit Recommendation

Subject	Level	Hours
Managerial Communications	Upper-Division	3 semester hours
National security studies and military strategy	Upper-Division	3 semester hours

Source: SOS Academic Credit Recommendation, 1999

The 3 semester hours for Graduate Leadership/Managerial Human Relations is not received by the nonresident course.

Air Command and Staff College. Air Command and Staff College (ACSC) is the Air Force's Intermediate Service School (ISS). While some Air Force officers attend ISS at schools sponsored by other branches of the service, most attend ACSC if they pursue this level of PME. The nine-month long school was established at Maxwell Field, Alabama in 1946. The school is designed to target majors and major selects, and focuses

on shaping and molding tomorrow's squadron commanders. Three of the schools 14 courses are geared for leadership and command education (ACSC History, 1999).

ACSC's curriculum centers on the influence of aerospace power at the operational level of war. It starts with an examination of the dynamic international security environment; continues with the broad, conceptual issues surrounding conflict; and the body of thought relating to how and why societies wage war, and the instruments of power. Next, it addresses the study of the military instrument of power. After examining the capabilities and limitations of US military forces, it transitions to the study of using aerospace power to attain national objectives. Students then study joint campaign planning in both the deliberate and crisis action environments. A computer-simulated war game synthesizing the operational aspects of war culminates the campaign-planning phase of the curriculum. Finally, the curriculum concludes by addressing both the imperatives of command and leadership in today's complex military environment and future trends in national security (ACSC Curriculum, 1999).

In 1948, ACSC established a Distance Learning (DL) Program to provide intermediate-level professional military education via correspondence to meet the needs of nonresident students. By 1969, ACSC expanded the scope of the program by implementing a seminar program to provide for the sharing of opinions, expertise, and experiences among seminar members. The ACSC distance learning curriculum is delivered on CD-ROM, print-based materials, and via the Internet. Students receive an integrated multimedia curriculum that includes textbook readings, video, and interactive applications. Students may choose one of three methods to complete the program.

1. Correspondence (self-study): This method affords students the opportunity to choose the time and place of study. Students may enroll at any time throughout the year and ACSC provides a recommended schedule for students to follow. Students have 18-month to complete this program and must achieve a minimum score of 70% on each of 4 examinations
2. Seminar: In this 11-month program students meet weekly in a forum designed for the free exchange of ideas and opinions on vital issues facing the USAF, DoD, and the nation. Seminar participants share unique background experiences and technical expertise. ACSC provides the framework for conducting the seminar program by providing a schedule for the seminars to follow. Seminars begin in early August of each year and are composed of 8-18 members.
3. Cyber Seminars: In this 11-month program students meet weekly in a “cyberspace” forum designed for the free exchange of ideas and opinions on vital issues facing the USAF, DoD, and the nation. Seminar participants share unique background experiences and technical expertise. ACSC provides the framework for conducting this seminar by providing a schedule for the seminars to follow. Seminars begin in August of each year and are composed of 8-15 members. Students are responsible for obtaining an Internet service provider (ISP) and are financially responsible for all costs associated with their on-line services. Students conduct weekly meetings in the ACSC Electronic Classrooms. Students choosing this method of study must contact the ACSC Distance Learning Department upon enrollment (ACSC Distance Learning, 1999).

Students selecting the seminar and cyber-seminar methods must serve as a lesson leader for a variety of lessons, achieve a minimum score of 70% on each of 4 examinations, and have no more than 6 absences.

ACSC maintains a Distance Learning Electronic Campus on the Internet. If students are TDY or do not have access to a computer with a CD-ROM, they can complete most lessons over the Internet. In the on-line Library students can find the latest updates, research papers, and Real-Audio files from ACSC, as well as links to military related web sites. Additionally, students can post messages on bulletin boards and join on-going discussions in the classroom areas. The most current version of course ware (2.1 - released in August 98) is completely accessible from ACSC's secure, version specific website. The American Council on Education (ACE) recommends up to 27 hours of graduate credit for the completion of ACSC by Distance Learning (ACSC Distance Learning, 1999).

School of Advanced Airpower Studies. The School of Advanced Airpower Studies (SAAS) is an 11-month follow-on course for selected graduates of ACSC. A directive issued in 1988 by the Air Force Chief of Staff, General Larry D. Welch, officially established the school and the first class convened in the Summer of 1991. SAAS is the most selective of all Air Force PME schools accepting less than 5 percent of those eligible to volunteer. Only 25 Air Force officers are selected to attend each year.

The SAAS recognized the key to success in any educational institution is the faculty. SAAS has gone to great lengths to obtain a highly qualified faculty and to cultivate their talents. From the beginning, SAAS leadership sought a balanced faculty containing both civilian and serving military scholars. The SAAS Dean and Associate

Dean are responsible for the leadership and management of the school in addition to being fully qualified faculty members who teach normal classes (at a reduced load). Further, they are expected to conduct research and publish. The student to faculty ratio is less than 3 to 1 and each student is assigned a personal faculty mentor at the beginning of the academic year, and is later assigned a thesis director/advisor.

The SAAS curriculum is an intensive forty-eight week program. Although individual courses within the overall curriculum change over time, the central themes for the curriculum combine the study of ideas (theory, strategy, doctrine), people (leadership), technology, and organization. Although graduate colloquia dominate the curriculum, SAAS uses other instructional methodologies as well. These include a major computer assisted wargame, case studies, field trips, and guest speakers. The primary instructional forum is seminar, where students interact with each other and the instructors. A thesis-quality research paper is required, and to graduate, students must pass each course and an oral comprehensive exam administered by a faculty committee. Upon successful completion, officers receive a Master of Airpower Art and Science degree and proceed to positions where their enhanced knowledge can be best put to use (SAAS Overview, 1998; SAAS Home Page, 1999). SAAS only consists of an in-residence program.

Air War College. The Air War College (AWC) is the Air Force's Senior Service School (SSS), and is the final stop on the officer PME ladder. Like ISS, officers may attend the SSS of one of the other services, but most attend the Air Force school if they are seeking this level of PME. Lieutenant Colonels and Colonels are eligible to attend (Air Force Catalog 36-2223), but the student population is almost exclusively made up of

Lieutenant Colonels. The AWC was established on 12 March 1946 by War Department letter AG 352. Currently there are approximately 250 students designated for the resident classes each year, including those from all US military services, civilian governmental agencies, and many allied air forces. More than 8,000 resident students have graduated from the Air War College.

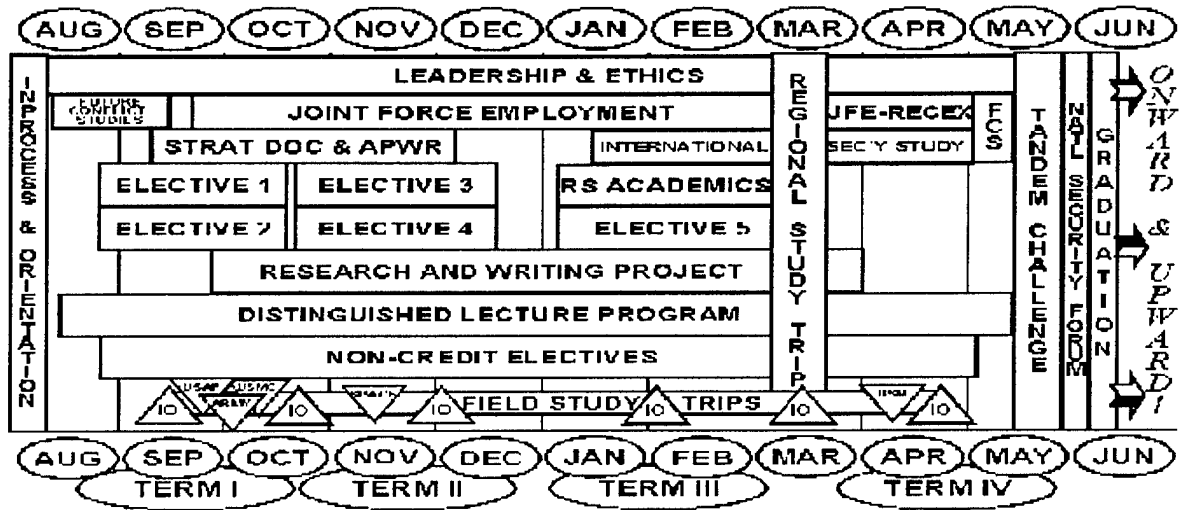
AWC is intended to educate senior officers to lead at the strategic level in the employment of air and space forces, including joint operations, in support of national security. The curriculum is constructed specifically to challenge the students to think critically and creatively regarding the changing roles and missions of future military forces, their employment, and national security. The whole process of planning the year of study begins with faculty counseling to assist in determining career educational needs, taking into account academic interests. Faculty academic mentoring continues throughout the year.

The academic year (August through early June) provides a comprehensive course of studies over a 10-month period, involving a core curriculum program, as well as an electives program. The Core Curriculum Program is designed and taught by military and civilian faculty from five core departments:

- Future Conflict Studies (FCS)
- Strategy Doctrine and Air Power (SD&A)
- International Security Studies (ISS)
- Joint Force Employment (JFE)
- Leadership and Ethics (L&E).

The core electives are also designed and taught by the same faculty. The electives directly complement the core curriculum and provide the students the opportunity to

study areas of personal and professional interest. The electives are spread out over three academic terms.



Source: Air War College AY 1999-2000 Catalog

Figure 2. Air War College Curriculum

The above chart shows the integrated fashion with which the students undertake the different course areas. The chart provides a graphical representation of the AWC curriculum, but fails to show any detail. To gain a better understanding to the emphasis

that is placed on every area of study, it is best to view the curriculum summary.

Table 3. Air War College Contact Hours

Area of Study	Contact Hours
Future Conflict Studies	30
Leadership and Ethics	42
International Security Studies	57
Strategy, Doctrine, and Air Power	68
Joint Force Employment	140
Core Electives Program	150
Commandant's Time	100
Regional Studies Program (Academics and Field Study)	104
Orientation	10
Wellness	11
TOTAL - Resident Program	712

Source: Air War College Overview

The American Council on Education (ACE) recommends academic credit in the following areas for completion of the AWC:

Table 4. Air War College Academic Credit Recommendation

Subject	Level	Hours
Military History and Evolution of Strategic Thought	Graduate	6 semester hours
Regional Studies	Graduate	3 semester hours
Defense Resource Management	Graduate	6 semester hours
Defense Policy and National and International Security Studies	Graduate	12 semester hours
Total Credit		27 semester hours

Source: Air War College Overview

The nonresident portion of AWC began in 1947 as the Air War College Extension Course, and currently is composed of both a seminar program and a correspondence program. While the mission, objectives, and philosophy of the nonresident course are the same, the course is divided into three core volumes and an elective volume. The seminar groups vary from eight to 20 in size and meet from August through June like the resident program. The program consists of 40 lessons and a 15 to 20 page writing assignment.

The correspondence program examination and writing requirements, as well as course material are identical to the seminar program. The program is completely self-study, and the participants have six months each to complete the four volumes. Advice and counsel is available from the Directorate of Nonresident Studies faculty. The academic credit recommendation is exactly the same for the nonresident course as it is for AWC in residence (Air War College AY 1999-2000 Catalog).

Communications and Information Career Field Training

The 333rd Training Squadron provides career field training for Communications and Information officers at Keesler Air Force Base, Mississippi. The training program consists of four different courses, each targeting a different time in an officer's career. The first two courses are held in the same building, and not only fall under the same squadron but the same flight. This flight is properly named Air Force Communications and Information Officer Training (AFCOT).

Basic Communications and Information Officer Training. The first course Communications and Information officers attend is the Basic Communications and Information Officer Training (BCOT) course. This course is usually attended right after an officer enters the career field, but is sometimes deferred for several months while the new officer gets their feet wet with their new job. Lieutenants comprise the bulk of the student body, although Captains who retrained from other career fields are also often present. The BCOT course is 12 weeks long and is intended to provide the basic level of communications and information knowledge requisite for junior officers. The goal is to introduce students to the communications and information requirements of both today's

and tomorrow's Air Force by combining technical instruction with concepts of the Air Force's vision (BCOT Home Page, 1999). The courses are taught in a classroom setting with 10 to 16 students per class. The program is broken into 9 blocks of instruction, beginning with a one-week "Foundation for the Communications and Information Officer." The new curriculum, revised the summer of 1999, is:

Table 5. BCOT Curriculum

Block 1	Foundations for the Communications and Information Officer	4 days
Introduces students to the fundamentals of roles, missions, strategies, visions, and responsibilities of communications and information officers to provide fixed and deployable services to the war fighter. In addition, this block discusses core values and core competencies for Air Force personnel.		
Block 2	Resource Management	4 days
Discusses the budget and procurement processes, touches on contract management, and concludes with communications implementation, project management, and force management.		
Block 3	Enterprise Engineering	4 days
Introduces students to the fundamentals of Enterprise Engineering by studying process improvement, information directives, information services, life cycle management, technical architectures, standards, and software management. A major goal is for students to understand how process improvement of information services support the joint strategies, visions, and missions used by today's warfighters.		
Block 4	Network Fundamentals	5 days
Small computer hardware, operating systems, network media, and network transmission methods.		
Block 5	Linux & Windows NT Server	20 days
Introduces students to the operating systems Linux and Windows NT Server. Linux is used to teach essential UNIX commands, from file manipulation to system administration. Windows NT Server is installed from scratch, and used to teach system administration skills, and installation and configuration of Microsoft DHCP server, Proxy Server, Exchange Server, and System Management Server.		
Block 6	Information Assurance	5 days
Focuses on Information Assurance--from basics of base information assurance and operationalizing and professionalizing the network, to handling classified information and considering communication networks as weapon systems.		
Block 7	Communications and Space Systems Fundamentals	5 days
Describes electromagnetic signalling, different modulation techniques, and some of the military land- and space-based devices that use these techniques.		
Block 8	Fixed Communications and Information Services	3 days
Topics the Objective Communications squadron, and the functions and responsibilities of the units and individuals therein.		
Block 9	Deployable Communications and Information Services	6 days
The joint operations chain of command, the deployment process, and specific deployable communications equipment are discussed in this final block of instruction.		

Source: BCOT Curriculum, 17 November, 1999

There is no correspondence version of BCOT at this time.

Advanced Communications and Information Officer Training. The second career field specific course, Advanced Communications and Information Officer Training (ACOT) course is usually attended when an officer is a senior captain or a major, and has been in the career field for eight to 13 years (Communications and Information Career Field Officer Professional Development Guide, 1999:8). ACOT is forum for shaping intermediate-level Air Force Communications and Information leaders by enhancing knowledge of current technology to optimize support to both operators and commanders. The course has a warfighting focus from beginning to end. The school also imparts an understanding for the need to reengineer all processes that need drastic improvement to ensure continued support for warfighters. Students will receive maximum exposure to leadership and field experts through video teleconferences (VTCs), guest lectures, and tours. Each student is required to complete homework, including research outside the classroom (ACOT Overview, 1999). The ACOT Curriculum is composed of the following units:

- Roles & Missions
- Strategies
- Software Management
- Information Management
- Enterprise engineering
- Spectrum Management
- Resource Management
- Air & Space Command and Control Systems
- Current Issues 1
- Operationalizing and Professionalizing the Network
- Information Assurance
- Networks
- Information Operations
- Emerging Technologies
- Expeditionary Aerospace Force (EAF)
- Current Issues 2

The first Current issues unit is one day in length, with all other units being four days long, making the duration of course 61 duty days. During the Emerging Technologies unit each student will be required to present a 15-25 minute presentation on an emerging technology in the career field. The two Current Issues units feature guest speakers from the field covering the pressing issues that Air Force Communications and Information officers face (ACOT Curriculum Web Page, 1999). There is no correspondence version of ACOT at this time.

Scope Eagle. Scope Eagle is the USAF capstone professional development course for the communications and information career field. Scope Eagle is a forum for senior executives in the career field to discuss corporate policies and issues as well as refresh themselves technically. Lieutenant General William Donahue, the director, communications and information, Headquarters Air Force sponsors the forum. The target audience for Scope Eagle is colonels, select lieutenant colonels and civilian equivalents in the career field. The Scope Eagle program has four areas of emphasis.

- Foundation
 - Covers architectures, systems and manpower issues
 - Looks at existing policies and guidance
- Current Issues/Topics - Air Force Perspective
 - Looks at key issues and topics facing the C & I community
- Current issues/Topics - External Perspective
 - Views and perspectives of agencies external to the Air Force regarding major programs and issues facing the C & I community at large
- Future Views and Senior Perspective
 - Vision and expectations of senior leaders for the future of the Air Force and C & I community

The course is five days long and is offered five times each year (Scope Eagle Course Overview, 1999). There is only a resident version of Scope Eagle.

Scope Warrior. Each year approximately 15 generals and high level civilians plus over 40 colonels attend the Scope Warrior Conference. Held in the autumn, this conference provides an Air Force wide forum for the coordination and guidance needed by Air Force Communications-Computer Systems organizations. The director for communications and information from each major command and unified command is expected to attend. Like the Scope Eagle program, the director, communications and information, Headquarters Air Force sponsors the forum. Scope Warrior lasts for one week and ends with a joint picnic where members of the BCOT and ACOT classes can socialize with the senior members of their career field (Scope Warrior Curriculum, 1999; 333rd Training Squadron Synopsis, 1998).

Optional Training

Beyond the standard Communications and Information career track training, officers find various types of training opportunities that they can capitalize on. While these types of training are virtually limitless, several of the most common training options will be reviewed.

Air Force Institute of Technology. Air Force officers are allowed to apply for graduate degrees at the Air Force Institute of Technology (AFIT). The school, as it currently exists, became a reality in 1954 when President Eisenhower signed a bill authorizing the commander of Air University to confer appropriate degrees. AFIT's mission is to provide responsive, defense-focused graduate and continuing education,

research and consultation to improve Air Force and joint operational capability. The school has a history of being able to create both courses and entire degree plans in very short time frames to meet the unique requirements of the Air Force. In 1994, the Air Mobility Command (AMC) formulated the requirement for a masters degree in Air Mobility. The approached AFIT with their new need and the degree program was in place in 1995. Most recently, the materials directorate of Air Force Research Laboratory (AFRL) saw the need for a materials science engineering graduate program. "A combined AFRL and AFIT executive committee was formed and new curricula were designed within four months. Less than a year later, in September 1998, the first master of science and doctor of philosophy students entered this program" (Haritos, 1999:8). Colonel George K. Haritos, AFIT Commandant, goes on to explain that this remarkable efficiency is a result of the school "having only one customer". "That enables our deans, department heads, faculty, staff and students to focus all of the curricula, research and consulting to the needs of our customer". In a recent review of the mission and goals of AFIT, senior management found only minor adjustments were necessary. Colonel Haritos attributed this to the simplistic aim of the institute, which he said has not changed in 80 years, and that is "to give the proper technical training." Focused graduate education is essential for the United States Air Force to sustain it's "intellectually capable, well educated and trained force" (Kankey, Muczyk and Ely, 1997:367)

AFIT offers 28 Masters of Science Degrees that include:

- Computer Engineering
- Computer Systems
- Electrical Engineering
- Operations Analysis
- Operations Research
- Systems Engineering
- Information Resource Management
- Information Systems Management
- Software Systems Management

Source: AFIT Degree Programs 98-99 Catalog

Admissions to the MS programs require a BS degree with the appropriate courses, a 3.0 GPA as well as scores of 500 verbal and 600 quantitative on the Graduate Record Examination (GRE). Waivers to some of these criteria may be considered on a case-by-case basis (AFIT Degree Programs 98-99 Catalog, School of Engineering Admissions Requirements). When selected to attend an AFIT masters degree program, students are assigned to Wright Patterson Air Force Base, Ohio, where they stay while they complete the 18-month program. AFIT also offers 10 Doctor of Philosophy in Engineering degrees including:

- Computer Science
- Computer Engineering
- Electrical Engineering
- Operations Research

Source: AFIT Degree Programs 98-99 Catalog

Graduating students are assigned to billets specifically identified for AFIT program graduates. Post-AFIT assignments last for three years, after which the officer goes back into the regular assignment system.

Information Resource Management College (IRMC), National Defense University (NDU). The National Defense University (NDU) was created in 1976 when two schools,

the National War College and the Industrial College of the Armed Forces were combined. The NDU is a military university whose president, either a lieutenant general or vice admiral, reports directly to the Chairman Joint Chiefs of Staff. Classes run from mid-August to graduation in mid-June. (NDU Catalog) The NDU's Information Resource Management College offers "leading-edge training in Information Resource management for lieutenant colonels and above" (Communications and Information Career Field Officer Professional Development Guide, 1999:10). The school is currently working on designing IRMC distance education courses for their DoD customers (Kasprzak, 1998:1). They have also started working on a continuing education system that will be supported by the World Wide Web. This new training system has been designated as the NDU Knowledge-Net. The goal of this system is to "deliver just-in-time continuing education to its constituency and provide a vehicle for life-long learning" (Alden, 1999:1). The first target of the new system will be the CIO community in DoD organizations. The new system should include:

1. Description of the CIO competencies
2. Summary of emerging issues
3. Links to useful sources
4. Listing and links to relevant conferences, training and education
5. Names, titles, profiles, and e-mail addresses of group members
6. Asynchronous threaded conferencing service for discussion forum
7. Scheduled chat sessions for pertinent issues

The Knowledge Net is expected to go public by the end of 1999 (Alden, 1999:2).

Air Force Communications Agency Seminars. The Air Force Communications Agency (AFCA) offers five separate seminars that Communications and Information

officers can attend. Each of the seminars is 5 days long and is held in residence at Scott

Air Force Base, Illinois. The courses offered are:

- Bridge Course
- Information Protection
- Maintenance
- Planning and Implementation
- Systems & Network Management

These courses are intended for officers with minimal base-level communications experience (Communications and Information Career Field Officer Professional Development Guide, 1999:11).

Air Force Supplied Computer Based Training (CBT). CBTs covering both technical areas and end-user applications are available from base communications squadrons. These information technology training courses were developed by Computer

Based Training Systems USA Ltd. to help keep both enlisted and officers qualified in the communications and information career fields. Available CBTs are:

- Application Development and Programming
- Cisco Routers
- COBOL
- Internet Security
- LAN Technologies
- Lotus Notes
- Managing Information Systems
- Microsoft End-User Operating Systems and Tools
- Microsoft Exchange Server
- Microsoft Internet Explorer
- Microsoft Networking Essentials
- Microsoft Office
- Microsoft Windows
- Network Management and Security
- Netscape
- Novell Certified Internet Professional
- Oracle
- Systems and Database Design
- Technical Support
- Telecommunications
- UNIX
- WAN Technologies

Officers can acquire these CBTs from their base communications squadron and use either their own personal computer, or the computer at their duty location (Communications and Information Career Field Officer Professional Development Guide, 1999:11-12).

AFIT Professional Continuing Education. AFIT Professional Continuing Education (PCE) is available to officers, enlisted and civilians of all ranks and grades. PCE classes can be either in residence, or accomplished by distance learning (DL), depending on the course. Five of the courses from the Software Professional Development Program have potential value to the Communication

and Information career field. These courses:

Table 6. AFIT PCE Software Professional Development Plan

Course #	Course Title	Per Day	Per Week	Duration	Delivery
CSE 492	Software Systems Engineering	2 hours	3 times	6 weeks	DL
CSE 493	Software Requirements and Design Engineering	2 hours	3 times	6 weeks	DL
CSE 494	Object-Oriented Analysis and Design	2 hours	3 times	6 weeks	DL
CSE 495	Software Creation and Maintenance	2 hours	3 times	6 weeks	DL
CSE 496	Software Engineering Practicum	8 hours	5 times	3 weeks	Residence

make up the entire Software Professional Development Program. This program is recommended for software engineers, project managers and other acquisition professionals. The program can also be a way for experienced programmers to keep current with newer techniques, including the Capability Maturity Model and object-oriented development. There is no tuition charge for the classes and the TDY is funded through AFIT for all USAF employees. After courses CSE 492, CSE 493, and CSE 495 the student receives a "Software Lifecycle Management" certificate. After completing the final two courses, CSE 494 and CSE 496 the student receives a certificate for "Applied Software Development" (Software Professional Development Program Overview, 1999:1-2).

Other Courses. Air Force officers require a myriad of training and education to get and stay proficient in their duty area. The additional training outside of that already covered includes third party classes such as Learning Tree, Oracle, and Solaris. These classes are generally taught at the vendor's location, but sometimes when the need is high, can be onsite. CBTs, both Air Force and third party, are often used to augment an officer's knowledge. A third option is purchased books in conjunction with on-the-job

training (OJT). These ad hoc training methods fill the void that the existing training system leaves behind. While it is not reasonable to believe a continuing education system can be built that leaves no holes, the goal is to minimize those holes and only use ad hoc methods when absolutely necessary.

Other DoD Training Programs and Initiatives

Defense Acquisition University. The foundation for career-long continuous learning was built by the Defense Acquisition Workforce Improvement Act (DAWIA) (Reform Through Learning, 1998:3). The Defense Acquisition University (DAU) was established by Congress in 1990 to consolidate and integrate education and training for more than 110,000 people in the defense acquisition workforce DAU Implementation Plan, 1997:2-2). This program was created at the highest possible level, the Under Secretary of Defense (Acquisition & Technology), because the need for training in this area was considered so financially important. This is critically important, since leadership is “the primary ingredient” to re-engineering (Hammer and Stanton, 1995:34). The DAU provides more than 85 acquisition courses to students at all levels, both military and civilian. DAU courses are developed and delivered by 12 DoD educational institutions and by contractors.

The Defense Acquisition education system assigns points to training and continuous learning activities. Acquisition personnel are required to earn a minimum number of “points” to get and maintain certain positions. The acquisition career field is broken down into 11 different tracks, with three levels in each track. The first two levels

of the career path for a Communications-Computer Systems Acquisition troop looks like this:

**Table 7. Communications-Computer Systems
Acquisition Personnel Career Progression**

Level	Rank	Experience	Education	Training
I	O1-O3	Mandatory: One year of acquisition experience in communication and computer systems	Desired: Baccalaureate degree, preferably with a major in computer science, management of AIS, business administration, or a related field	Mandatory: One basic level 1 DAU course in systems acquisition management Mandatory: One basic Level 1 course in AIS acquisition management
2	O3-O4	Mandatory: 2 years of acquisition experience; at least 1 year of this must be in communication and/or computer systems Desired: An additional 2 years of communication and/or computer systems acquisition experience, preferably in a program office or similar organization	Desired: Master's degree, preferably with a major in computer science, management of AIS, business administration, or a related field	Mandatory: 1 intermediate (Level 2) DAU course in AIS acquisition management Mandatory : 1 intermediate (Level 2) DAU course in systems acquisition management

Source: DoD 5000.52-M

The large number of requirements, 32,980 in 1996, forced the DAU to pursue alternative ways of training (DAU Implementation Plan, 1997:2-2). The DAU researched the best practices followed by industry leaders, universities, and other Government agencies in an attempt to find training solutions (DAU Concept Document, 1997:21). The six reasons to transition to a technology based training system identified

by the DAU are to:

- increase access
- increase capacity
- decrease costs
- improve quality of learning
- provide current and consistent courses
- provide variable pace for students

The DAU is so committed to technology-based instruction that they are in the process of transitioning all of their courses to that format. The DAU plans to leverage existing and emerging information technologies to meet both resident and distance learning requirements, even while resources are being reduced. The goals for their technology-based training and education plan are to:

- Maintain or improve curriculum quality
- Transition classroom-based instruction to technology-based delivery
- Increase acquisition participation
- Reinvest resources in IT solutions for enhanced performance
- Incorporate IT in all courses by the end of FY 2000

The DAU plans to increase the number of technology-based courses as follows.

Table 8. DAU Curriculum Transition Timeframe

Timeframe	# of courses
FY97	5
FY98	10
FY99	25
FY00	50

Source: DAU Concept Document, 1997:7

During this period, the classroom-based alternatives will still be offered to accommodate requirements that precede the complete transition of these courses to technology based delivery (DAU Concept Document, 1997:29). While these might seem lofty goals, the Defense Acquisition workforce is now being trained by a cutting edge system that is designed around what they believe to be the future construct for a learning institution.

The school has designed a system where the enormous number of training requirements can be filled in a cost-effective manner. The DAU is convinced that distributed learning environments are the answer to teaching a geographically dispersed group of employees while maintaining a centralized continuous education system. This is evidenced by the fact that some companies have cut their training budgets by up to 75%, replacing classroom training with technology-enabled solutions (Cole-Gomolski, 1999:1). From analysis to implementation, a course is expected to take only six to nine months to transition to a technology-based format.

Members of the defense acquisition workforce are required to receive and maintain certain levels of education and training to gain access to promotions. In fact, “approximately two-thirds of those certified at Levels Two and Three have not attended the courses that are now required for certification at those levels” (DAU Concept Document, 1997:3). The training system is actually outrunning the workers needing to be trained. The certification process established in 5000.52-M, “Career Development Program for Acquisition Personnel,” provides career advancement/retention incentives for completing courses. The students not only get the benefit of new knowledge and skills, but the fact the system tracks what courses they have taken, including College Level Examination Program (CLEP) and Defense Activity for Non-Traditional Educational Support (DANTES) scores. Full tuition reimbursement exists for taking classes that are approved for the career field (Reform Through Learning, 1998:6).

Air Force Distance Learning Office. The Air Force Distance Learning Office (AFDLO) was formed in December of 1995 to be the focal point for implementation of Air Force DL policy and emerging technology. According to “The Distance Learning

Roadmap”, the Air Force recognizes that not all courses are suitable for DL, but it believes that the education and training system can better serve the warfighter by increasing the emphasis on DL and advanced distributed learning (ADL). This change is due to the fact that DL courses can increase availability while lowering costs. Movement toward technology-based solutions for education and training is happening throughout the government and private sector (Reinhardt, 1995:1). This type of curriculum delivery will allow training to reach the airman in the field, whether they are at a stateside base or stationed in Saudi Arabia, even during a time of diminishing training funds. By following the Roadmap, the Air Force expects to increase it’s education and training reach while maintaining an average expenditure of about \$30 million (The Distance Learning Roadmap, 1999:8). The Roadmap focuses on four types of training and their

strengths and weaknesses:

Table 9. Curriculum Delivery Advantages/Disadvantages

Delivery Medium/Method	Advantages	Disadvantages
Resident Instruction	Direct observation of Performance Team building Collaboration Direct Interaction Real-time instructor Survives tech failures	Expensive (student travel/facilities) Not consistent Small classrooms Time and place dependent Limited enrollments
Interactive Video Teletraining (IVT)	Real-time Interactive World-wide classroom Facilitates collaboration and Team-building Student does not need computer Increased throughput Low drop-out rates	Expensive infrastructure Susceptible to tech failures Time and place dependent Student feedback barriers
Internet-based Instruction (IBI)	World-wide classroom Potential Net-based IVT Instant updates Both real-time and asynchronous Enables independent or group study Increased throughput	Requires access to Internet Susceptible to net failures Inadequate bandwidth no universal access yet Limited expertise and development Expensive infrastructure Security firewalls
Interactive Multimedia Instruction (IMI): CBT, ICW, CBI	Worldwide access Mastery of performance Relatively easy to update Fast audio/video Not instructor-based Standardized instruction Increased throughput	Expensive course development; requires design expertise Lengthy production Requires computer Susceptible to tech failures Distributed via CD-ROM diskette, or embedded

Source: The Distance Learning Roadmap, 1999:22)

Shrestha and Sutphin (1995-1996) found some traditional teaching techniques such as brainstorming, lecturing, role-playing and group discussions were less effective in satellite-based instruction (1995-1996:141). There is also some indication of institutionalized resistance to new technology-enabled learning techniques (Jaffee,

1998:1). In his book The Road Ahead, Bill Gates writes “Some fear that technology will dehumanize formal education” (1995:184). A study done by Lawrence (1995-1996) observed that students found the environment “exciting as well as challenging” when using a videoconferencing environment for group discussions (1995-1996:148-149). When looking at the advantages for classroom training, the most endearing are “the flexibility to change when needed” and “more information can be presented in a given time period (Kemp & Cochern, 1994:40). Like the studies reviewed by the DAU, the Air Force notes that “research shows no significant difference in learning outcomes when appropriate media are selected and good instructional systems design is employed” (Spooner, Jordan, Algozzine, and Spooner, 1999).

Research also indicates that existing instructional design methodologies can still be very useful when developing courses. The systems approach to designing courses, sometimes called Instructional Systems Design (ISD) can still be effective when creating courses that will be delivered using various media (Scafati, 1998:389). The Air Force currently has several courses that were designed using the ISD process, that are utilizing DL delivery techniques.

Table 10. Current Distance Learning Courses

Course	Delivery Method	Approx # Students per/year
AFIT AQ and CE	ITV	17,200
SNCOA Course 5	IMI	11,500
ACSC Non-resident	IMI and IBI	5,000
USAF Training Course	ITV	1,000
CAMS Operator	IMI	3,500
USAF Tech Orders	IMI	3,000
Train the Trainers	ITV	1,000

Source: The Distance Learning Roadmap, 1999:20)

The AFDLO has determined that the Air Force has approximately 400 courses eligible for DL conversion. The following chart shows the expected timeline for transitioning courses to the new delivery format.

Table 11. AFDLO Curriculum Transition Timeframe

Year	# courses eligible for DL conversion	# of eligible courses taught via DL	Percent
1999	400	0 formal courses	0%
2007	270	130 formal courses	33%
2013	120	280 formal courses	70%
2018	0	400 formal courses	100%

Source: The Distance Learning Roadmap, 1999:27)

A 1996 Mission Needs Analysis (MNA) identified five deficiencies that hinder the development of DL courses in the Air Force. Those deficiencies were all tied to facilities, infrastructure and training for faculty and staff members of training organizations. Those deficiencies are being worked on, but most still exists today (The Distance Learning Roadmap, 1999:38).

United States Army Initiatives. Between 1970 and 1975, the Army spent more than \$6 million on communications systems that failed to afford them a training solution. In 1983 the Army decided to try again, and through a collaborative effort with a commercial company began to have success at DL (Johnson, 1989:65). The Army considers their DL system vital to their readiness. The new Army program, Total Army DL Program (TADLP) is expected to provide whatever training is needed to whoever needs it, even U.S. Army National Guard and U.S. Army Reserves, wherever they might be. The idea is that if training is needed in the field, it gets done. The Army has already had great success with providing technology-enabled training to soldiers in the field from the Sinai Desert to Bosnia. The TADLP will be implemented in three phases and calls

for conversion of 525 courses. For FY 98 the program was expected to develop 35 courses and set up 63 classrooms at a cost of about \$38 million. The plan is to have 625 classrooms at the various bases within seven years and 745 by the year 2010. The long term plan is to have imbedded systems in equipment such as Bradley vehicles and tanks, so they can plug into the DL network 9 The Distance Learning Roadmap, 1999:52-53).

United States Navy Initiatives. The U.S. Navy has long been confronted with distributed learning requirements. For most refresher and proficiency training, the Navy brings the training to the individual. The Navy is fast moving towards an extensive DL environment. To achieve a more consolidated and focused approach to training and training initiatives, the Office of Training Technology (OTT) was established in January 1995. The OTT is the Navy's focal point/liaison for Navy-wide training technology issues. The OTT provides policy, establishes guidance, and evaluates potential contributions of identified training technologies. The Navy uses a interactive video teletraining (IVT) network for both DL and teleconferencing. The system uses satellites to communicate with ships at sea, and telecommunication lines to communicate with shore locations. The Chief of Naval Education and Training (CNET) Electronic Schoolhouse network (CESN) system consists of 19 sites with 25 classrooms. The system is available 24 hours every day and is used an average of 10 hours per day, 5 days a week. In 1997, the Navy offered 52 courses through the network. The Navy plans on spending another \$161 million on distance learning technologies between FY 97 and 2003. The Navy is currently collaborating with Old dominion University to offer off-duty college degree/certificate programs that have been specifically tailored for Navy

personnel located at CESN sites, including those at sea (The Distance Learning Roadmap, 1999:54-55).

Education and training are separate functions in the Marine Corps, but they are both managed by the Commanding General, Marine Corps Combat Development Command (MCCDC). The Marine Corps Learning Network (MarineNet) is an initiative designed to create a DL network for the Corps. MarineNet will provide a comprehensive DL network that will provide Marines with global access to standardized electronic training and education. The system will have a Distance Learning Center (DLC) at the command level that will provide standardization, certification and quality control. Below the DLC, there will be three schools performing as Functional Learning Centers (FLC). The role of the FLCs is to be the primary developers of DL courseware. This echelon represents the primary delivery point for DL courseware. The lowest tier is the Area Learning Center (ALC), where students will actually attend classes in locations all around the globe (MarineNet Pilot Initiative Message). The Marine Corps expect every military occupational skill (MOS) to have at least one DL module.

Vice President Al Gore's promise to "reinvent government," while only receiving minimal attention, has actually made a significant difference in certain areas of government (Drucker, 95:285). In January of 1999 President William J. Clinton signed executive order 13111 which states "I am creating a task force on Federal training technology, directing Federal agencies to take certain steps to enhance employees' training opportunities through the use of training technology". The executive order also calls for an advisory committee to explore options for financing the training and education necessary to upgrade skills and gain new knowledge. Within 18 months of the

order, the Task Force is required to submit a policy to make effective use of technology to improve training opportunities for Federal Government employees. The two key mandates were for the training to be "affordable and convenient". The DoD along with the National Institute of Standards and Technology are charged with developing consensus standards for training software and associated services (EO13111, 1999). Twigg (1994) foresaw this turn of events in the mid-'90s.

Section 378 of Public Law 105-261, the Strom Thurmond National Defense Authorization Act for Fiscal Year 1999 requires the Secretary of Defense to develop a strategic plan for guiding and expanding distance learning initiatives within the DoD. On 30 April 1999, the DoD presented their Strategic Plan for ADL to the 106th Congress. This plan was responsive not only to the requirement from Congress, but also to EO13111. The strategic plan states that "Training and learning models developed for the 21st century revolve around two new concepts: The learning organization and advanced delivery systems" (7). The DoD, in the Quadrennial Defense Review (QDR) of 1996, decided to develop a Department-wide strategy for technology-enabled learning. The DoD is now going past the goal of DL, "right time, right place" and advocating the Advanced Distributed Learning Initiative (ADLI) which seeks an "any time, any where" philosophy. The Initiative's underpinnings and applications are germane not only to the DoD, but to other government organizations as well. The Department's vision is to "harness the power of the Internet and other virtual or private wide-area networks (WANs) to deliver high-quality learning. It brings together intelligent tutors, distributed subject matter experts, real-time in-depth learning management, and a diverse array of support tools" (DoD Strategic Plan for ADL, 1999:8). The goal is to ensure a responsive,

high-quality “learner-centric”: system. The DoD is already working with industry for guidelines and standards on training and learning environments (Bethoney, 1999:2). The ADL strategy requires re-engineering the learning paradigm from a classroom-centric model to a learner-centric model. It is important to understand that re-engineering means radical change, not minor modifications and tinkering (Hammer and Champy, 1994:32). Stephen C. Ehrmann, called the move to technology-enable learning a “Revolution” (1999:24). It will also require re-engineering the learning business process from a “factory model” to a “network-centric information-age model” which allows anytime-anywhere learning. “Most of the boundaries within which we currently operate are truly obsolete” (Ward, 1994:24). The greatest challenge will be for faculty and educational administrators that have done business the same way for decades (Davis, 1999:21) As mentioned earlier in this chapter, students rate DL as highly as residence courses, instructors attitudes are that DL is equal or less effective (Inman, Kerwin, 1999:581).

A cultural change will be required for ADLS to be successful. The challenge will be to get leadership to provide appropriate learning opportunities throughout the duty day. “Learning that enhances the readiness of Department personnel must not be viewed as an additional or a personal-time responsibility” (DoD Strategic Plan for ADL, 1999:12).

Summary

Communications and Information officers are currently exposed to three different training avenues. They receive professional military education at designated times, either by going to Maxwell AFB, AL or by taking correspondence courses. These courses teach

officership, core values, and other areas that are commonly referred to as "blueing".

These courses are taken in the first year (ABC), around 7 years (SOS), around 13 years (ACSC) and finally at about the 18 year point.

Communications and Information officers also take a track of training that is geared toward their career field. These courses (BCOT, ACOT and Scope Eagle) are taken in residence at Keesler AFB, MS. BCOT is usually attended in the first year in the career field, while ACOT is not taken until someone has been in the career field for 10-15 years. The final course occurs several times per year, but is only taken by certain officers.

Optional training that is available to officers includes the Air Force Institute of Technology. This school provides graduate degrees that can be obtained by completing an 18-month in residence program. Another degree granting institution, the National Defense University is available for advanced degrees, but requires officers to be Lieutenant Colonels or above to apply, therefore eliminating most of the career field. Five training seminars are available from the Air Force Communications Agency, but must be taken in residence. The Air Force also offers several CBTs that cover a variety of technical areas.

Communications and Information officers receive training outside the first two tracks on an ad hoc basis. This training is not tracked in the personnel system, but is often funded by the officer's organization.

Several military training systems have similar properties to that of the Air Force. These organizations have many of the same concerns, primarily reaching as many people as possible, with the limited funds they receive. Another similarity between other

training arms of the military is their requirement to train all over the globe. The entire DoD is being pushed to develop technology based learning systems that will meet these demands.

Conclusion

The training system for PME has been providing distance learning for over 50 years. Officers only participate in these courses about every 7 years, but since they teach material that doesn't change as rapidly as technology, that is probably sufficient. The technical training and education that Communications and Information officers receive has a gap of around 10 years between the first two classes. This is far longer than would be expected from looking at the rapidly changing knowledge requirements of a technology driven career field. The courses are only offered in residence, giving little to no flexibility for the students. AFIT is a good opportunity for officers, but to attend they must be taken out of the workforce for 18 months, and not all officers are afforded this opportunity. This can only be considered a long-term benefit, not a solution to training and education requirements. The initiatives that are being undertaken by the DAU, as well as the rest of the military will go a long ways towards making more training and education available to the masses in every career field.

III - Methodology

Overview

This chapter describes the methodology used to answer the investigative questions specified in Chapter I. Data gathered from a descriptive survey will identify subject areas that are training deficient, and give feedback from the field on when best to incorporate each subject into the career long training program. An overall picture of officers' perception about the current training system should also emerge. Explanations about the relevant population, data collection method, survey development and testing, sample size, sample selection, survey administration and data analysis procedures are given.

Relevant Population

The relevant population of this research effort was comprised of Air Force Captains, Majors and Lieutenant Colonels currently serving as Communications and Information officers. These particular ranks were chosen because they have been in the training system for at least four years. This research was looking at career long training issues and lieutenants have been in the career field for a maximum of four years, with the average being close to 2 years. For this reason, they were not included in the research population. The rank of Colonel was excluded because a person of that rank could not have started out as a Communications and Information officer, since the career field is not old enough. It is also probable that a significant amount of training has changed in the last 20 years, and their insight to the training system would be antiquated. The population was comprised of officer serving in any position, and at any location around the globe. Per Major Lisa Jacques, Air Force Communications and Information Center

(AFCIC) representative, there were 2591 Communications and Information officers meeting these requirements at the time of this study (Jacques, 1999). The table below reflects population proportion, based on rank, as supplied by Major Jacques.

Table 12. Communications and Information Officer Rank Distribution

Communications and Information Officer Rank Distribution	
Lieutenant Colonel	515
Major	704
Captain	1372

Data Collection Method

Choosing a communication method is not as complicated as it might first appear. It is important to look at both your objectives as well as your target population. Using this information, one of the survey methods will probably be a better fit than other methods (Cooper and Schindler, 1998:309). Since Air Force officers are located all around the globe, and are frequently away from their work areas on temporary duty, the mail survey has the best likelihood for success. This is supported by both the decision to use this technique and the subsequent success of the aforementioned theses in this area. Biros and Cole (1992:27) found that "A review of all possible methods revealed that the questionnaire is more advantageous than other means of survey data collection (specifically telephone interview and personnel interview)." This observation was based on consideration of cost, opportunity, anonymity, required manpower as well as the time afforded the respondents.

Survey Development and Testing

The survey was based on the skills analyzed and organized by Schmidt (1997) and subsequently used in a follow-up thesis by Phillips (1998). Modifications were made to the Phillips version of the survey to bring it up to date, and bring it more in line with the investigative questions being asked for this research. The Phillips' survey had 24 subject areas, broken into three categories, Technical Specialties, Technology Management and Interpersonal Skills. For the first draft of the survey, these same categories and subject areas were kept, with the questions being changed to align with the investigate questions trying to be answered. In Phillips' survey, four questions were asked about each subject area:

- 1) How critical is knowledge in the subject area?
- 2) Rate the skills of the officer in your organization in the subject area?
- 3) What was your primary source of training in the subject area?
- 4) What is the primary source of training you expect in the subject area?

To bring the survey in line with the investigative questions of this research, there were only two questions asked of the subject areas. They are:

Part V - When should an officer receive each type of training?

Part VI - How critical is the need for the training in this area?

In addition to those two areas of the survey, Part I is a demographic section mirrored after the Phillips' survey with additional questions (Part III) regarding what kinds of courses the respondents have had exposure. Part IV of the survey solicits information about perceptions of the current training system. The final section of the survey (Part VII) asks the respondent to assess the overall quality of the training system, as well as an

open-ended question that allows them to provide any training feedback they might have. Part IV and the question in Part VII regarding the quality of overall training both provide a Five-point Likert scale for the answers. This was chosen to allow the data to be analyzed more in-depth and to calculate significant statistical data. Part V did not allow for a Likert scale, since both “just-in-time” and “recurring” were selection choices. The primary disadvantage that was identified is low response rate, but that can be overcome by sending out a sufficient number of surveys. Other identified disadvantages are “no ability to probe deeper” as well as the potential for only extremes to return the surveys.

To insure validity, the survey was reviewed by AFIT IRM faculty as well as twelve AFIT Information Resource Management graduate students. These were military students that matched the demographics of the relevant population. Modifications were made based on the judgements and recommendations of these experts. The same group of graduate students as well as the project sponsor, AFIT’s vice commandant, and the Air Education and Training Command Director of Communications and Information reviewed the second draft of the survey. The survey was then modified to reflect recommendations. During the review process, a fourth subject area was added, Information Operations, since it was identified as a prominent subject area that has developed over the last two years. Some subjects were moved from one grouping to another based on the recommendations of the reviewers. An example is that “Systems Life Cycle Management” was moved from “Technical Specialties” to “Technology Management” based on it more accurately fitting into that group. Overall, the survey subject areas remained unchanged. Per AFI 36-2601, Air Force Personnel Survey

Program, the survey was approved by AFPC Survey Branch and was issued a survey control number (SCN 99-79) prior to release to the selected population.

Required Sample Size

The reliability of the collected data is dependent on the size of the sample, not the size of the population or the number of samples solicited (Alreck and Settle, 1995:30). A power analysis was completed to determine the required sample size utilizing the following formula (A Guide for the Development of the Attitude and Opinion Survey, 1974:14-16);

$$n = \frac{N(Z^2)p(1-p)}{(N-1)(d^2) + (Z^2)p(1-p)}$$

where: n = sample size

N = population

p = maximum sample size factor (.5)

d = desired tolerance (.05)

z = factor of assurance; 1.645 for a 90 percent confidence interval

Applying the formula to the data for this research effort, the following n was determined.

$$n = \frac{2591(1.645^2).5(1-.5)}{(2591-1)(.05^2) + (1.645^2).5(1-.5)}$$

$$n = 245$$

where: n = sample size (returned surveys required)

N = population (total relevant population)

p = maximum sample size factor (.5)

d = desired tolerance (.05)

z = factor of assurance; 1.645 for a 90 percent confidence interval

The power analysis revealed that 245 returned surveys were needed for this study based on the population size of 2,590.

A second method of determining necessary sample size shows that a minimum of 100 and maximum of 10% of the population is considered appropriate parameters for a survey/questionnaire (Alreck & Settle, 1995:62).

Sample Selection

It is hard to determine what return rates a mail survey will receive, but four theses done in similar areas of study have had return rates ranging from 54.3 percent to 72.4 percent (Scott, 1990:56; Biros and Cole, 1992:30; Schmidt, 1997:50; Phillips, 1998:37). While mail survey return rates are expected to be around 30 percent (Alreck and Settle, 1995:25; Cooper and Emory, 1995:282), based on the previous theses in the same area of interest, with a similar target audience, it is assumed that the response rate will be near 50 percent.

In order to select a stratified random sample from the relevant population, the following events occurred.

- 1) The AFIT Registrar's office provided an MS Excel spreadsheet containing the names and addresses of all Communications and Information officers in the rank of Captain, Major and Lieutenant Colonel.
- 2) A sample of the list was reviewed by a Base Information Transfer System (BITS) representative who advised a limited list of bases be used for the survey. This was due to the fact that certain bases receive bulk mail from Wright-Patterson AFB and only these bases deliver mail that does not contain the building number as part of the address. None of the addresses provided by the AFIT's Registrar contained building numbers, therefore these were the only subjects that were eligible for the mailing.

The locations that will deliver mail with addresses not containing building numbers are:

Table 13. Bulk Delivery Bases

Andrews AFB, MD	Kelly AFB, TX	Ramstein AB, GE
Arnold AFB, TN	Kirtland AFB, NM	Randolph AFB, TX
Bolling AFB, DC	Lackland AFB, TX	Riyadh AB, SA
Brooks AFB, TX	Langley AFB, VA	Robins AFB, GA
Davis Monthan AFB, AZ	Los Angeles AFB, CA	Scott AFB, IL
Edwards AFB, CA	Maxwell AFB, AL	Sheppard AFB, TX
Eglin AFB, FL	McClellan AFB, CA	Tinker AFB, OK
Elmendorf AFB, AK	McGuire AFB, NJ	Travis AFB, CA
Gunter Annex, AL	Nellis AFB, NV	Tyndall AFB, FL
Hanscom AFB, MA	Offutt AFB, NE	Vandenburg AFB, CA
Hickam AFB, HI	Patrick AFB, FL	
Hill AFB, UT	Pentagon Washington, DC	

Source: Military Correspondence Preparation Guide,
Consolidated (Pouch) Mail Listing for Wright Patterson AFB, OH.

- 3) The data was screened and only those subjects with addresses to one of the previously mentioned bases, or to Wright-Patterson AFB were left active.
- 4) Using a random number generator in Microsoft Excel, each person was given a number between 1 and 3, dividing the group into six groups.
- 5) Again, using Microsoft Excel, a random number between 1 and 3 was generated. The number 3 was returned and every subject in the sample that had been assigned a 3 was selected to participate. There were 592 rows that qualified for participation in the survey.

Survey Administration

Survey packages were mailed to all 592 of the selected participants on 1 October 99 with a requested response date of 29 October. Based on the success of Phillips' survey, it was decided that 4 weeks provided adequate time for responses. Each survey package provided a cover letter describing the purpose of the study as well as the

interested parties, the survey, and a pre-addressed return envelop to make it easy for participants to return the survey. Since the survey was "Official Business", the survey participants were not be required to provide postage to mail the survey back. There were 49 surveys returned for the following reasons.

Table 14. Survey Rejects

LTC	Eglin	Retired	1		
LTC	Langley	Insufficient Address	1		
LTC	Pentagon	Assigned to GSU	4		
LTC	Peterson	Retired	1		
LTC	Randolph	Retired	1		
LTC	Robins	No Street Address	2		
LTC	San Antonio City	PCS'd	1	Total LTCs	11
<hr/>					
MAJ	Hill	PCS'd	1		
MAJ	Maxwell	AFSC miscoded	1		
MAJ	Offutt	PCS'd	1		
MAJ	Offutt	Unclaimed	1		
MAJ	Pentagon	Incorrect Address	1		
MAJ	Pentagon	Assigned to GSU	10		
MAJ	Robins	No Street Address	3		
MAJ	Scott	Retired	1		
MAJ	Wright-Patterson	PCS'd	1	Total MAJs	20
<hr/>					
CPT	Kelly	PCS'd	1		
CPT	Laughlin	Insufficient Address	1		
CPT	Elmendorf	PCS'd	1		
CPT	Langley	TDY	1		
CPT	Offutt	Unclaimed	1		
CPT	Pentagon	GSU	1		
CPT	Pentagon	Insufficient Address	1		
CPT	Robins	No Street Address	8		
CPT	Tinker	Unclaimed	1		
CPT	Tyndall	NOTCS	1		
CPT	Tyndall	Unclaimed	1	Total CPTs	18
				Total Returns	49

It is impossible to tell how many were left in the in-basket of officers that were off performing duty in some other location, but given the nature of the military environment, there would be some. The complete breakdown of survey response data is included as

Appendix B. It is important to note that the BITS at Robins AFB rejected all 13 surveys for not containing building numbers.

Data Analysis Procedures

The collected data was entered into a spreadsheet that was developed using Microsoft Excel.

Part I and Part III. The demographic and background information was analyzed through descriptive measures to reveal the classification of the respondents. Tables and figures were used to show the numbers, totals and percentages.

Part IV. The general perception data was aggregated and analyzed. The results were given in a table format. Tables and figures were used to show the numbers, totals and percentages.

Part V. Data from Section 2 of the survey was aggregated and analyzed. Tables were used to show the frequency of each selection and show trends where they existed.

Part VI. Data from Section 3 and the first question in Section 4 were aggregated and analyzed. These results were given in a table format. The data was also used to calculate averages as well as standard deviations, which were both order used to rank the choices.

Part VII. Finally, the second question in this part gathers comments from the respondents and is presented using general themes found through the surveys.

An analysis of the data is presented in Chapter IV.

IV - Data Analysis

Introduction

As previously stated, the purpose of this research was to identify the perceptions of Communications and Information officers regarding training needs. The investigative questions to be answered by the questionnaire were:

- 1) What training areas do Communications and Information officers feel need additional emphasis beyond that received in the current career training system?
- 2) At what point during a Communications and Information officer's career would be most appropriate for each of the needed training areas?
- 3) What is the best way to incorporate the additionally needed training into the existing training system that exists for Communications and Information officers?

This chapter will first present the demographic data of those who participated in the study. Next it presents the statistical data from the areas on training background and general perception. Statistical analysis of the data from Part V and Part VI will then be used to attempt to answer the three research questions. The first question in Part VII will then be presented in a statistical manner to show the perception of current career field training

Demographic Information

The purpose of Part I of the questionnaire was to gather demographic data about the individuals that participated in the research. This section had eight questions to identify rank, time in service, time in career field, whether the respondent is a prior

Information Management officer, education level, whether the respondent had attend BCOT and/or ACOT, as well as whether they were a student or graduate of an AFIT's Master's program.

Rank. As indicated in the following table, captains are the largest group of respondents, even though they had the lowest relative response rate. Since the other two ranks, Majors and Lieutenant Colonels are both field grade officers, the breakdown between company grade and field grade is almost even (46% to 54%). A breakdown of the respondents by rank is illustrated in Figure 3.

Rank Distribution

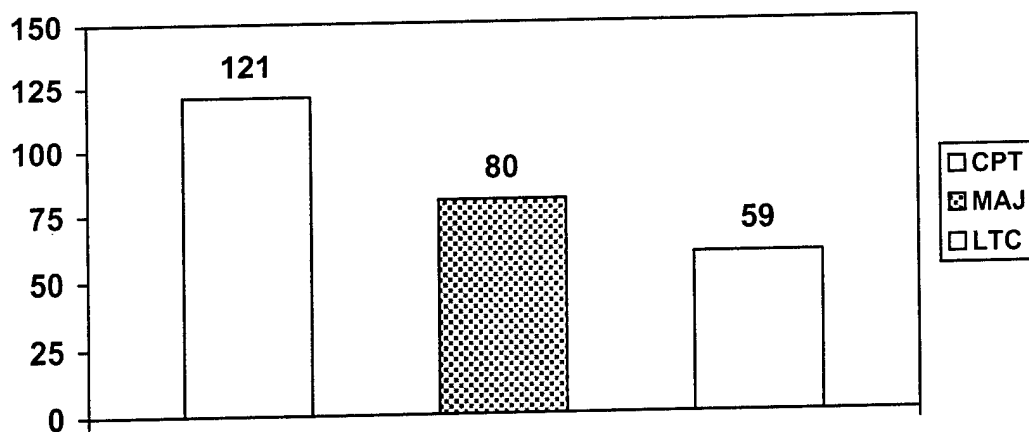


Figure 3. Rank Distribution

The following table shows that even though Captains reflect the highest number

of respondents, they were the lowest in terms of return rate percentage as well as percentage of the career field represented.

Table 15. Rank Representation

Rank	Number Returned	Number in Career Field	Percent Of Career Field	Number Sent minus rejects	Percent Returned of Surveys Sent
Captain	121	1372	8.8%	284	42.6%
Major	80	704	11.4%	147	54.4%
Lt. Col.	59	515	11.5%	112	52.7%
Blank	2				
Total	262	2591	10.1%	543	48.3%

Time in service. The following table shows the time in service for each of the respondents. This information represents total time in the Air Force. No attempt was made to separate noncommissioned years and commissioned years of service.

Table 16. Time in Service

Time in Service (in years)		
4 to 8	38	15%
8 to 12	42	16%
12 to 16	62	24%
16 to 20	71	27%
More than 20	47	18%
Left Blank	2	1%
Total	262	

Only 31% of the sample have been in less than twelve years, with the overwhelming numbers being in from twelve to twenty years. Forty-seven respondents (18%) are retirement eligible, having already completed twenty years of service. One interesting note about the following figure is that 37% of the captains who responded to the survey

have been in the service for more than 12 years. This is due to the fact that several of them have prior-enlisted time added into their total active service time.

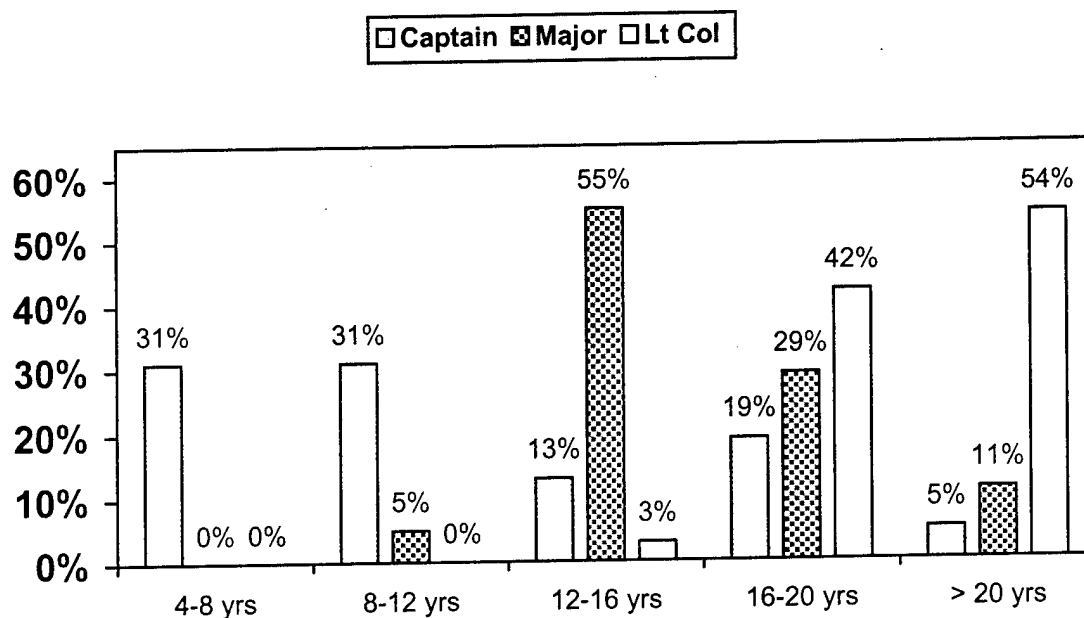


Figure 4. Time in Service by Rank

Given the amount of time it takes to make the rank of major it is not surprising that there were no majors with less than eight years time in service and only 5% with four to eight years. Likewise, it is expected that there were no lieutenant colonels with less than 12 years and only 3% with less than 16 years.

Number of years as a Communications and Information Officer. The following table shows how long each of the respondents have been in the career field. An officer's time-in-service might not be the same as their total commissioned time since they might have prior enlisted time, or they might have started out their career in another career area. It is possible that both are true, some respondents might have been enlisted, then entered

officer ranks in another career field and later became a Communications and Information officer.

Table 17. Time in Career Field

Time in Career Field (in years)		
Less than 3	18	7%
3 to 6	67	26%
6 to 9	34	13%
9 to 12	28	11%
More than 12	113	43%
Left Blank	2	1%
Total	262	

The largest group of respondents was those with more than 12 years in the career field (43%), with the second most being those with three to six years in the career field (26%).

The following figure shows a breakdown by rank that gives more information.

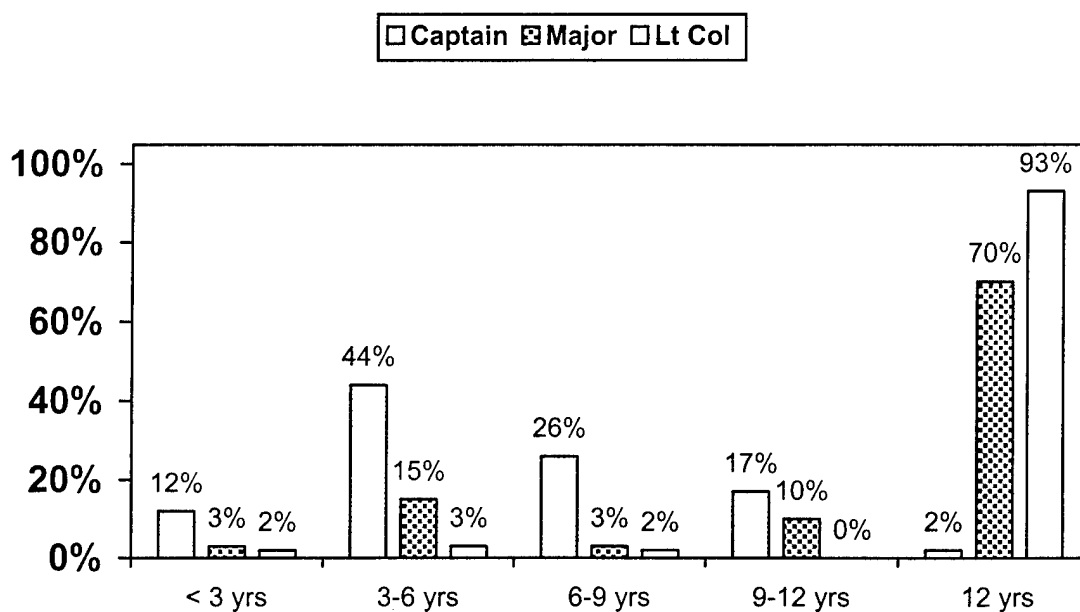


Figure 5. Time in Career Field by Rank

The above information shows that 18% of the majors that responded have been in the career field for six years or less. This figure also shows that 45% of the captains have been in the career field for more than six years, with 19% having been in the career field

for more than nine years. Ninety three percent of the lieutenant colonels that responded have been in the career field for more than 12 years.

Previous Information Management (IM) Officers. The fourth question was asked to determine what number of the respondents was from the old IM career field. This career field merged with the Computer and Communications career field to form the present career field. The following figure shows the breakout of that information.

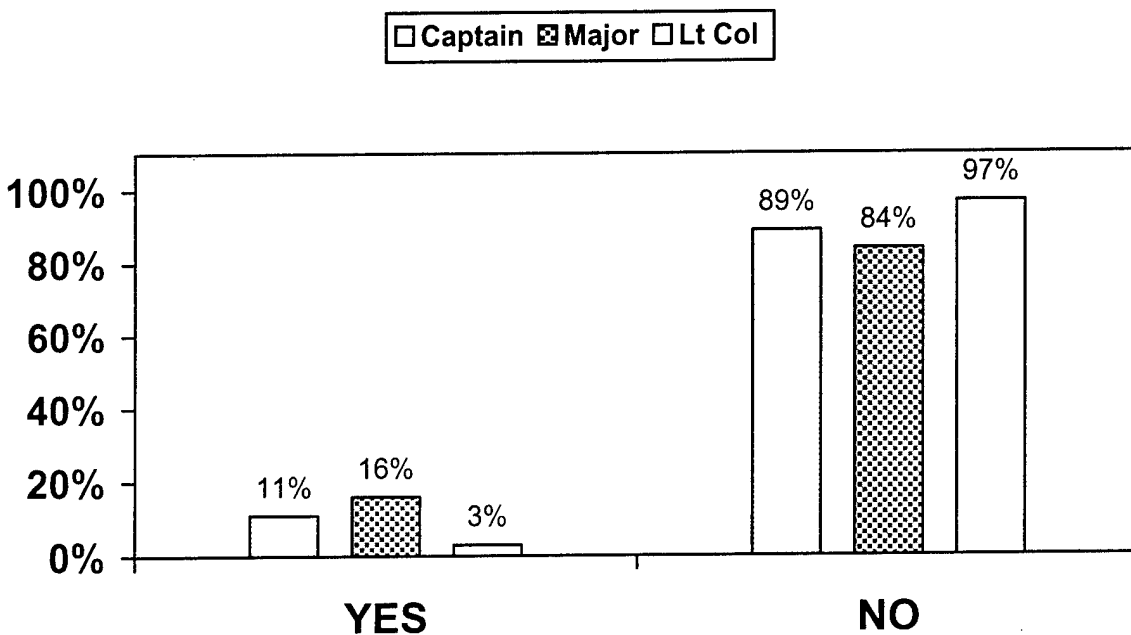


Figure 6. Officers Previously in IM Career Field

Some concern has been shown that officers that came from the IM career field did not have the technical background required for the Communications and Information career field.

Education. The highest level of education by each participant was also gathered.

The table below shows that most of the respondents, over 75%, have achieved at least a Master's degree.

Table 18. Highest Education Level Attained

Education		
Bachelor's Degree	55	21%
Master's Degree	198	76%
Doctorate	7	3%
Blank	2	1%
Total	262	

Seven of the respondents have completed their doctorate, and two respondents did not answer this question. The reported education levels are of significance since it shows the respondents have exposure to higher education and can make an educated judgement of where future training should progress for the career field.

Basic Communications and Information Officer Training (BCOT). The questionnaire also asked participants if they had attended BCOT. Basic Communications and Information Officer Training usually occurs within the first year an officer is assigned to the career field. Officers who change into this career field from another usually attend if they have not passed the rank of captain. This course was waived in the 1980s for officers that had Computer Science Bachelor's Degrees.

Table 19. BCOT Attendance

BCOT Attendance								
	Captains		Majors		Lt. Colonels		Total	
YES	109	90%	50	63%	29	49%	188	72%
NO	12	10%	30	38%	30	51%	73	28%
Blank	0		0		0		1	0%
Total	121		80		59		262	

The above table indicates that the majority of officers did attend BCOT, but the numbers are not overwhelming. Even though 28% did not attend, we can see from the breakdown

that a significant majority of captains (90%) did attend BCOT. The percentage drops for majors, and even more for lieutenant colonels with less than half (49%) having attended.

Advanced Communications and Information Officer Training (ACOT). This is the training that officers usually attend about 10 years after entering the career field. This training targets senior captains and majors.

Table 20. ACOT Attendance

ACOT Attendance								
	Captains		Majors		Lt. Colonels		Total	
YES	38	31%	66	83%	40	68%	144	55%
NO	83	69%	14	17%	19	32%	117	45%
Blank	0		0		0		1	0%
Total	121		80		59		262	

The above table shows that the majority of majors and lieutenant colonels attended ACOT, while captains have only attended at a 31% rate. This is due to the fact that only senior captains are eligible to attend, therefore keeping the rates low.

AFIT Master's Program. The next question asked if the respondent was either a student or a graduate of an AFIT Master's program.

Table 21. AFIT Master's Program Participation

AFIT Master's Program Participation								
	Captains		Majors		Lt. Colonels		Total	
YES	19	16%	27	34%	17	29%	64	25%
NO	102	84%	53	66%	42	71%	197	75%
Blank	0		0		0		1	0%
Total	121		80		59		262	

The above table shows that 25% of the respondents are either currently in, or a graduate of an AFIT Master's program. Thirty-four percent of the majors that responded fall into this category. This seems to be an extremely high number of officers that have participated in the AFIT program. This source (AFIT advanced degree programs), given

the above numbers, is a significant part of the Communications and Information officer training opportunity.

Summary of Demographic Information

The demographic information reveals many facts about the individuals responding to the questionnaire. In this survey, the typical respondent was a captain. Over half of the respondents had been in the service between eight and 12 years. Forty-three percent, by far the highest category, of the respondents had been in the career field for more than 12 years. Most of the respondents had attended BCOT, ACOT and had achieved a Master's degree. Although a high number (25%) had participated in an AFIT Master's program, the number was well below half. Overall, there was a good mix of respondents in all categories with the highest majority being 76% had achieved a Master's degree as their highest level of education.

Questionnaire Results

Part III - Training Background

Section three of the survey was intended to determine what types of training, and in what quantities, Communications and Information officers had received exposure. There were five questions in this section asking the respondents to identify what level of exposure they had experienced to each type of training.

Department of Defense Computer Based Training. The first question in this section asked the respondents to identify how many DoD CBTs they had taken. The

following table shows the results.

Table 22. Number of DoD CBTs taken

Number of DoD CBTs taken		
none	88	34%
1 - 2	87	33%
3 - 5	51	19%
6 or more	34	13%
Blank	2	1%
Total	262	

This data shows that most respondents (66%) have been exposed to DoD CBTs. Since less than half (33%) of the respondents have taken more than two CBTs, this is still very limited exposure to this particular training avenue.

Commercial Vendor CBTs. This question was intended to find what exposure the respondents had to commercially available CBTs. The examples given were Oracle and Data General, but any commercially available CBTs were to be included. The results are captured in the following table.

Table 23. Number of Commercial CBTs taken

Number of Commercial CBTs taken		
none	172	66%
1 - 2	49	19%
3 - 5	24	9%
6 or more	17	6%
Blank	0	0%
Total	262	

The majority of the respondents had never taken a commercial CBT.

Distance Learning, Web-based or VTC Courses. This question was intended to find what exposure the respondents had to DL courses, whether commercial or military

provided. The results are captured in the following table.

Table 24. Number of DL courses taken

Number of DL courses taken		
none	186	71%
1 - 2	59	23%
3 - 5	12	5%
6 or more	5	2%
Blank	0	0%
Total	262	

A significant majority (71%) of the respondents had never taken a DL course.

Classroom Courses Provided by Commercial Vendor. This question was intended to find what exposure the respondents had to commercially provided in-classroom training. This is a common type of training that officers might receive if there is a training deficiency and a short amount of time to resolve it. There might also be some need based on certain courses that are not provided by the military. The following table breaks down the results of this question.

Table 25. Number of commercially provided classroom courses taken

Number of commercially provided classroom courses taken		
none	97	37%
1 - 2	68	26%
3 - 5	55	21%
6 or more	42	16%
Blank	0	0%
Total	262	

The majority (63%) of the respondents had taken a commercially provided in-class course. The numbers in the other categories also show that Air Force officers utilize this form of training. Thirty-seven percent of the respondents have had at least 3 courses in this manner and 16% have had at least 6 of these courses.

DoD Classroom Training. The respondents were instructed not to count BCOT, ACOT or PME courses when answering this question. This question was intended to find what exposure the respondents had to military courses that utilize this form of instruction. The results are captured in the following table.

Table 26. Number of military provided classroom courses taken

Number of military provided classroom courses taken		
none	36	14%
1 - 2	67	26%
3 - 5	79	30%
6 or more	80	31%
Blank	0	0%
Total	262	

This was the most prolific form of training identified by this portion of the survey. A majority (61%) of the respondents had taken at least 3 courses in this manner, and 31% had taken at least six. Only 14% of the respondents had never taken a course in this manner

Summary - Part III

The majority of the survey's respondents have little exposure to CBTs and DL forms of training. This is not surprising, since these are newer forms of training that are just starting to expand into the military. The highest category identified by the respondents was in residence military training, with over 85% having taken at least one class in this manner. The least common technique of training that the respondents had experienced was distance learning, with only 29% having every received this type of training/education.

Part IV - General Training Perceptions

Part IV was intended to gather some of the perceptions about potential training needs in the career long training system. These questions were regarding the need for additional training in the gaps between schools, whether the training should be mandatory, whether it should be tracked by the personnel system, and whether an officer should incur additional obligation for attending these courses. The final question asked if the respondent was aware of the CBTs that are available at every base, to see if they were even aware of the training that had been recently made available to them.

Need for Additional Training between BCOT and ACOT. This question was intended to determine if officers in the field felt that the gap (approximately 10 years) between the two schools is excessive. According to current literature, there is too much change in information technology career fields to go without training for an entire decade. This question was intended to see if there was consensus of this among the respondents. The following table shows the results of this question.

Table 27. Need for Training between BCOT and ACOT

Need for Training between BCOT and ACOT		
Strongly Disagree	3	1%
Disagree	9	3%
Neither agree nor disagree	15	6%
Agree	90	34%
Strongly Agree	145	55%
Blank	0	0%
Total	262	

The responses to this question show that there is overwhelming belief among those participating that additional training is needed between the two schools (ACOT and BCOT). Only 4% of the respondents believed that additional training was not needed between the two schools.

Need for Additional Training after ACOT. This question was intended to determine if officers in the field felt that additional training needs existed for officers that have already completed ACOT. The following table shows the results of this question broken down by rank, since most captains might not be exposed to the training needs for a post-ACOT career.

Table 28. Need for Additional Training after ACOT

Need for Additional Training after ACOT								
	Captains		Majors		Lt. Colonels		Total	
Strongly Disagree	0	0%	2	3%	0	0%	2	1%
Disagree	0	0%	0	0%	2	3%	2	1%
Neither agree nor disagree	24	20%	6	8%	3	5%	33	13%
Agree	38	32%	34	43%	20	34%	93	35%
Strongly Agree	58	48%	38	48%	34	58%	131	50%
Blank	1	1%	0	0%	0	0%	1	0%
Total	121		80		59		262	

This clearly shows, like the prior question, that the respondents believe that additional training is needed during this time frame. This also shows that the majority (24 of 33) of the respondents that selected "Neither agree nor disagree" were in the rank of captain, and have not been exposed to this point in a career since ACOT is primarily for senior captains and majors. While 80% of captains saw a need for additional training after ACOT, the numbers were even higher for majors (91%) and lieutenant colonels (92%).

Personnel System Tracked Officer Training. This question was intended to determine if officers felt that the training an officer receives should be tracked in the

personnel system.

Table 29. Need for Tracking Training

Need for Tracking Training		
Strongly Disagree	5	2%
Disagree	22	8%
Neither agree nor disagree	45	17%
Agree	114	44%
Strongly Agree	76	29%
Blank	0	0%
Total	262	

The responses to this question show that a majority (73%) believes that training should be tracked. There was no attempt to determine why training should be tracked, but possible reasons are for promotion credit, or for assignment selection.

Requirements for Training/Continuing Education. This question was intended to determine if officers felt that training/continuing education should be mandatory. The following table shows the results of this question.

Table 30. Should Training/Continuing Education be Mandatory?

Should Training/Continuing Education be Mandatory?		
Strongly Disagree	6	2%
Disagree	38	15%
Neither agree nor disagree	48	18%
Agree	107	41%
Strongly Agree	63	24%
Blank	0	0%
Total	262	

The responses to this question show that a majority (65%) of the respondents believes that training/continuing education should be mandatory for members of the career field. Eighteen percent listed no opinion, while 17% felt training/continuing education should not be mandatory.

Active Duty Service Commitments (ADSC). This question was intended to determine if officers were willing to incur an additional commitment to the military in exchange for desired training. There are already several cases where ADSC are required for attending training and education opportunities. The ADSC for attending the AFIT Master's program is three years. The following table shows the results of this question.

Table 31. Acceptance of ADSC for Desired Training

Acceptance of ADSC for Desired Training		
YES	225	86%
NO	36	14%
Blank	1	0%
Total	262	

The responses to this question show an overwhelming majority (86%) of the respondents was willing to stay with the Air Force longer in exchange for training. This helps to offset the belief that trained individuals will jump ship and take their valuable training elsewhere. While this still may happen, at least the commitments will keep it from happening as quickly.

Available CBTs. This question was intended to determine if officers were aware of existing training that exists at every major base. These CBTs, discussed in Chapter II, are available to all military members that need them. The following table shows the results of this question.

Table 32. Are you aware of available CBT training?

Are you aware of available CBT training?		
YES	155	59%
NO	107	41%
Blank	0	0%
Total	262	

The responses to this question show that a large number of the members of the Communications and Information career field were unaware of available training. This is critical since it does not matter if training is available, if the members of the target audience are unaware of its existence.

Summary - Part IV

A majority of respondents believe that more training is needed in the career field. Eighty-nine percent felt that more training was needed between BCOT and ACOT, while 85% felt more training was needed after ACOT. These numbers are even more significant when you look at the numbers of those who felt no training was needed in those two time periods. Only 4% felt no additional training was needed between BCOT and ACOT, while 2% felt no additional training was required after ACOT. While 73% of the respondents felt that training should be tracked in a personnel system, it is impossible to speculate why they felt this way. The questionnaire did not specify why the training would be tracked, so one cannot assume the reasoning of the respondents. An important note is that since only 10% felt it should not be tracked, most respondents are not averse to having the information maintained in their personnel files. Sixty-five percent of the respondents felt that training should be mandatory, so again assumptions can be made that the 33S populous is not terribly averse to having training mandates. The data show that most people feel it is necessary to expect this training to occur. It is also telling that 86% of the respondents are willing to accept an additional service commitment to receive training. This is especially relevant since the military is currently experiencing difficulty in keeping manning levels at an acceptable point. The final responses to the final question show that many people in the career field were not aware of existing training

that was already paid for and available to all. This is important as the career field moves into an age when distributed learning opportunities will increase, and making officers aware of the availability and location will be paramount to the optimal usage of that training medium.

Part V - When to Receive Training

This section reviewed when it is best to receive training in 29 different areas. The data does not conform to a Likert scale, so it will be reviewed in a strictly descriptive format. The options for when training should occur were:

- 1) Beginning of Career (BCOT)
- 2) Beginning and Recurring
- 3) First 4 years of Career
- 4) 4 to 8 years into Career
- 5) After 8th year
- 6) As Needed - Just-in-Time
- 7) Never

The first training category, technical specialties, was comprised of twelve training areas.

The relative frequencies of the respondents' choices are reflected in the following table.

Table 33. When to receive training in areas of Technical Specialty

Technical Specialties - Relative Frequencies							
Training Area	1	2	3	4	5	6	7
Telecommunications	39%	47%	9%	0%	0%	5%	0%
Networks	29%	54%	11%	1%	0%	6%	0%
Relational Databases	14%	18%	18%	3%	0%	46%	1%
Distributed Processing	18%	16%	17%	5%	0%	42%	1%
Software Engineering	14%	14%	10%	9%	0%	47%	6%
Programming Languages	9%	13%	7%	3%	0%	56%	12%
HTML & Web site Building/Mgmt	16%	27%	15%	2%	0%	37%	2%
Decision Support Systems	9%	18%	16%	15%	4%	36%	2%
Expert Systems/Artificial Intelligence	7%	9%	9%	9%	4%	56%	4%
Operating Systems and OS Tools	17%	28%	12%	2%	1%	40%	2%
Military Applications	15%	37%	17%	7%	0%	25%	0%
Office Automation	41%	41%	3%	0%	0%	14%	0%
Average for Technical Specialties	19%	27%	12%	5%	1%	34%	2%

In eight of the technical specialty areas (relational databases, distributed processing, software engineering, programming languages, HTML & Web site building and management, decision support systems, expert systems/artificial intelligence, and operating systems/OS tools), Just-in-Time training was the highest response category. In seven of these, all but HTML & Web site building and management, the relative frequency was at least double the second highest category. This shows that for these technology areas, the respondents feel that training should occur at different times for different officers. "HTML & Web site building and management" was selected to receive training in the beginning (16%) and "beginning and recurring" (27%). While these numbers were not the highest relative frequencies, they were high enough to be significant, especially since they involve the overlap of beginning training.

Three of the technical specialty training areas (telecommunications, networks, and office automation) called for training to be received either in the beginning, or "beginning and recurring". Only a small percentage of the respondents, 14%, 17%, and 17% respectively, selected a training time other than these two. All three of these technical specialty areas showed over 40% of the respondents selecting "beginning and recurring".

"Beginning and recurring" was the most selected response (37%) to when training on military applications should occur. The numbers were also significant in the categories of Just-in-Time (25%) and beginning (15%). It is possible that beginning training could be combined with a Just-in-Time training that could be used to satisfy recurring training for those feeling it is necessary.

Training in the areas of technical specialty fell into two major categories, those that should be taught only when needed, Just-in-Time, and those that should be taught at

the beginning and recurring through an officer's career. It is notable that 12% of the respondents felt that training was never necessary in programming languages, and 6% felt that it was never necessary in software engineering. This is reflective of the fact that most of the programming that officers were once responsible for has been outsourced. Of the other 29 training areas, none received more than 4% in the "Never" category.

The second training category, technology management, was comprised of ten training areas. The relative frequencies of the respondents' choices are reflected in the following table.

Table 34. When to receive training in areas of Technology Management

Technology Management - Relative Frequencies							
Training Area	1	2	3	4	5	6	7
Systems Analysis & Design / Case Methods and Tools	11%	15%	20%	11%	2%	41%	0%
Systems Life Cycle Management	17%	26%	22%	19%	1%	15%	0%
Project Management	15%	29%	24%	22%	2%	9%	0%
Information Management / Information Resource Management	18%	39%	20%	12%	2%	10%	1%
Emerging Technologies	5%	54%	8%	10%	2%	20%	0%
Corporate-wide Info Systems / Technology Planning	4%	24%	16%	29%	9%	16%	1%
Information & System Security	16%	63%	9%	5%	1%	6%	0%
Contingency Planning / Disaster Recovery	12%	40%	19%	14%	3%	13%	0%
Corporate Data Architecture	8%	16%	10%	25%	7%	31%	2%
Acquisition and Contracting	5%	19%	16%	21%	8%	30%	1%
Average for Technology Mgmt	11%	33%	16%	17%	4%	19%	1%

The majority of respondents felt that training in emerging technologies (54%) and "information & system security" (63%) should occur both at the beginning of the career field as well as recurring. While a significant percentage (41%) felt that training in "systems analysis and design/ case methods and tools" should occur with Just-in-Time training, the remaining respondents were broken up over four different categories. These

numbers were distributed rather evenly with each of the categories getting at least 11% and the highest being 20%. Information management/Information resource management showed very similar numbers to those of contingency planning/disaster recovery. The highest frequency (39%, 40%) for both these areas occurred in “beginning and recurring”, while four other categories had frequencies ranging from 10 to 19%.

The remaining five training areas were even more clouded. Each of these areas (systems life cycle management, project management, corporate-wide information systems/technology planning, corporate data architecture and acquisition/contracting) had at least two categories with 20% or more of the responses, with no category receiving more than 31%. Systems life cycle management was so evenly spread that the difference between the first and fifth ranked categories was only 11%. The respondents were not able to reach any kind of consensus regarding these five training areas. One interesting item is that the areas of corporate-wide information systems/technology planning (9%), acquisition/contracting (8%) and corporate data architecture (7%) were the only areas of the 29 listed that received more than 5% in the “more than 8 years into the career” category. On an additional note the training area corporate-wide information system/technology planning was the only case where the highest frequency occurred in a category other than “beginning and recurring” or Just-in-Time. The highest number of respondents (29%) chose four to eight years as the best time to learn this subject area.

The third training category on the questionnaire was interpersonal skills. While consisting of only five areas, Schmidt found this group to be the most important skill set for information resource managers (1997). The following table shows the relative

frequencies of the respondents' choices.

Table 35. When to receive training in areas of Interpersonal Skills

Interpersonal Skills - Relative Frequencies							
Training Area	1	2	3	4	5	6	7
Written Communication	28%	60%	8%	0%	0%	1%	2%
Oral Communication/Briefing Skills	27%	61%	8%	1%	0%	1%	2%
Working with/within Teams	26%	57%	12%	0%	0%	2%	2%
Counseling	13%	44%	19%	13%	2%	7%	2%
Teaching/Instructing/Coaching	8%	33%	19%	16%	7%	17%	2%
Average of Interpersonal Skills	20%	51%	13%	6%	2%	6%	2%

The category "Beginning and recurring" received the highest frequency of responses for each of the five training areas. Three of the areas (written communication, oral communication/briefing skills, and working with/within teams) had well over 50% of the responses in this category. The second highest frequency for these three categories was "beginning", which received over 25% of the responses for each. Combining these two categories (beginning and "beginning and recurring") gives over 80% of the responses for each of these three areas.

The other two areas (counseling and teaching/instructing/coaching) had their responses more spread out. While the area of counseling had 44% of the responses in "beginning and recurring", there were three other categories that had at least 13%. Teaching/instructing/coaching was easily the least concentrated of the interpersonal skills with four different categories having more than 15% of the responses. As a group, interpersonal skills were the most similar in the way the frequencies were distributed amongst the different areas.

The final category on the questionnaire was information operations. This is a category that did not appear on the three previous theses in this area, but that was

necessary due to its emerging importance in the career field. The following table shows the relative frequencies of the respondents' choices.

Table 36. When to receive training in areas of Information Operations

Information Operations - Relative Frequencies							
Training Area	1	2	3	4	5	6	7
Offensive Information Operations	11%	35%	14%	11%	1%	29%	0%
Defensive Information Operations	14%	48%	14%	6%	0%	18%	0%
Average for Information Operations	13%	41%	14%	8%	1%	23%	0%

While the highest frequency for both areas occurred in "beginning and recurring", there were also significant numbers under Just-in-Time, with Offensive registering 29% of the responses in that category. Since these are new areas of importance in the career field, officers might develop a more mature opinion of where this type of training should occur.

Summary - Part V

The majority of the respondents selected either "beginning and recurring" or Just-in-Time in 28 of the 29 areas, with the only exception being corporate-wide information system/technology planning with 29%. Just-in-Time training was selected for the majority of the technical specialties, with telecommunications, networks, military applications and office automation being the exceptions. "Beginning and recurring" was the most frequent selection for every area within both interpersonal skills and information operations. The areas in technology management were broken up between both "beginning and recurring" and Just-in-Time training, with one area having the highest frequency in the four to eight year category. Computer languages and software engineering, both from the technical specialties group, were the only areas that received more than 5% in the "Never" category for training.

Part VI - Need for Additional Training/Continuing Education

One key difference in this study and the work of Schmidt and Phillips is that rather than trying to find out what areas are important for information resource managers (IRM), this questionnaire tries to uncover in what areas Communications and Information officers need additional training. This study does not try and determine what areas are important to the career field, that has been done time and again (studies by Phillips, 1998, Schmidt, 1997, Biros and Cole, 1992); this study focuses on what areas are perceived to need additional training. A Likert scale was used to query the respondents as to how badly the training is needed in each of the 29 areas. Using a Likert scale for this kind of ranking has been used previously in studies by Young and Lee, 1997, Trauth, et al, 1995 and 1993, Lewis, et al, 1995, Leitheiser, 1992 (Schmidt, 1997:62) as well as Biros and Cole, 1992, Schmidt, 1997, and Phillips 1998. Using a Likert scale will allow for averages to be used to determine which areas are deemed to be most in need of training, as well as calculating the variation of opinion by using standard deviation. The respondents were given five choices for evaluating the need for additional training.

- 1 - No Need
- 2- Slight Need
- 3 - Moderate Need
- 4 - Significant Need
- 5 - Critical Need

The following table shows the aggregated results of this portion of the questionnaire.

Table 37. Perception of Additional Training Needs

Perception of Additional Training Needs			
Rank	Group	Topic	AVG
1	TS	Networks	3.937
2	TM	Information and System Security	3.898
3	IO	Defensive Information Operations	3.731
4	TS	Military Applications	3.693
5	TM	Project Management	3.594
6	TM	Emerging Technologies	3.502
7	TM	Contingency Planning/Disaster Recovery	3.427
8	TS	Telecommunications	3.400
9	IS	Written Communication	3.372
10	IS	Oral Communication/Briefing Skills	3.306
11	TM	Corporate-wide Information System/Technology Planning	3.297
12	TS	Office Automation	3.283
13	IO	Offensive Information Operations	3.261
14	IS	Working with/within Teams	3.260
15	TM	Information Management/Information Resource Management	3.224
16	IS	Counseling	3.174
17	IS	Teaching/Instructing/Coaching	3.043
18	TM	Systems Life Cycle Management	3.035
19	TS	HTML & Web Site Building and Management	2.996
20	TM	Acquisition and Management	2.921
21	TS	Operating Systems & OS Tools	2.862
22	TM	Corporate Data Architecture	2.746
23	TS	Decision Support Systems	2.680
24	TS	Relational Databases	2.579
25	TS	Distributed Processing	2.444
26	TM	Systems Analysis and Design/CASE Methods and Tools	2.381
27	TS	Software Engineering	2.349
28	TS	Expert Systems/Artificial Intelligence	2.126
29	TS	Programming Languages	2.087

Six of the areas show results greater than 3.5, which is closer to “significant need” than it is to “moderate need.” These training areas are from three different groups, with “interpersonal skills” being the only group that is not represented in the top 6. This is interesting given that the previous work (Schmidt, 1997; Phillips, 1998) show that the most important skills for information resource management (IRM) are interpersonal skills. This could be due to the fact that training is not as deficient in interpersonal skills

as it is in other areas. The highest rank for any interpersonal skills is at 9 and 10 where we see written communication as well as oral communication/briefing skills. Another notable finding is that seven of the bottom 9 areas are from the technology specialties group. This is consistent with the aforementioned work that listed technical areas as the least important to the IRM career field.

Only six of the 29 areas showed more than .3 difference in the averages of any of the three ranks that participated. Programming languages, the area that was deemed to be least in need of additional training is reflected in the figure below.

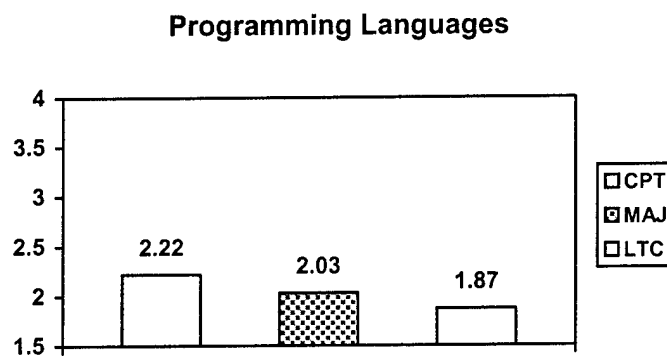


Figure 7. Perceived need for Programming Languages Training

This figure shows that as officers increase in rank, they perceive less need for training in the area of programming languages. Even though this is the lowest area of the 29, it drops even lower as officers move up into less technical and more managerial positions. The next area that showed more than .3 difference in the mean responses based on rank is operating systems and OS tools. Figure 8 shows the results of the

perceived need for operating systems and OS tools training broken down by rank.

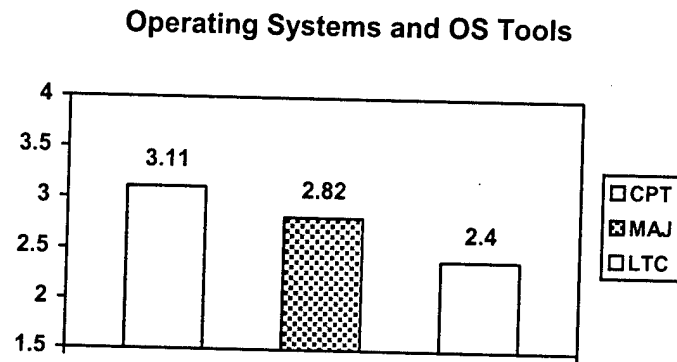


Figure 8. Perceived need for Operating System and OS Tools Training

Similar to Figure 7, this chart shows that as an officer gains rank, they perceive a declining need for training in this area. Operating systems and OS tools is also a very technical area that manager would probably not be required to understand at a detailed level. The next area where rank affects the distribution comes from the technology management group. Figure 9 shows how perceived need is distributed based on rank.

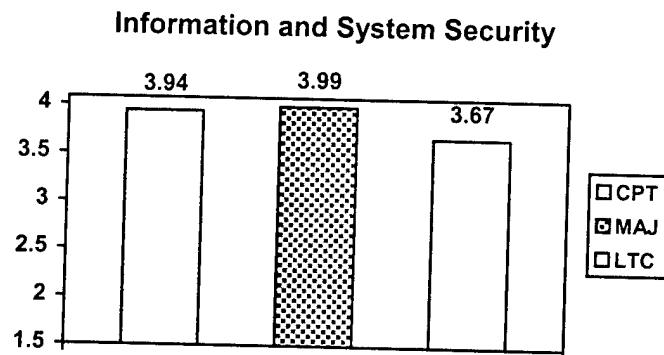


Figure 9. Perceived need for Information and System Security Training

This is an area that officers of all ranks would be highly interested in. There is no way to speculate why officers in the rank of lieutenant colonel do not find this as significant a need as do their junior officers. At 3.67, lieutenant colonels are still estimating the need for training in this area to be closer to significant than moderate. Training in Corporate

data architecture is another technology management area where rank had an impact on the perceived need for additional training. The following figure reflects the perceptions based on rank.

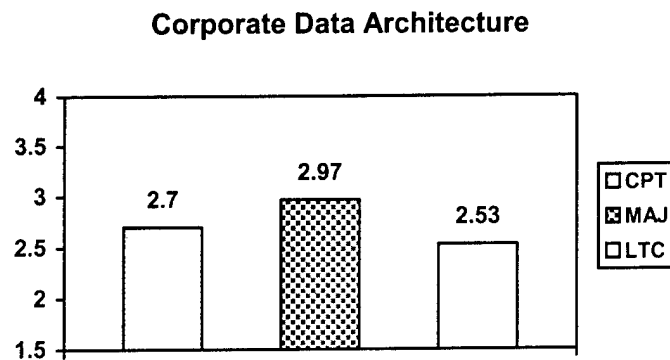


Figure 10. Perceived need for Corporate Data Architecture Training

This figure reflects the largest difference of perception being between the ranks of major and lieutenant colonel. The perceived need rises and then drops sharply. It is possible that more officers in the rank of major are grappling with information engineering issues like corporate data architecture. Officers in the rank of major considered the need for this training to be moderate, while lieutenant colonels placed it evenly between slight and

moderate. The last area in technology management that shows a difference of more than .3 is “Acquisition and Contracting.” This is reflected below in Figure 11.

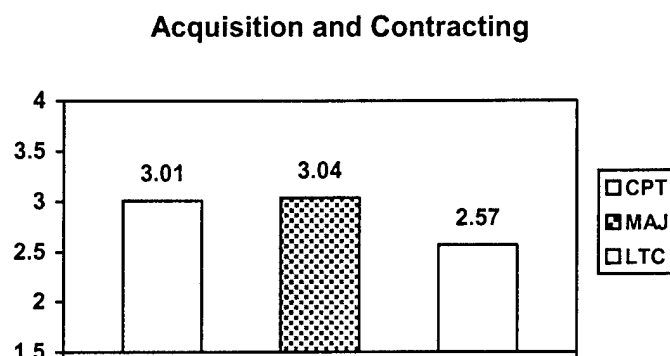


Figure 11. Perceived need for Acquisition and Contracting Training

As the figure clearly shows, the perceived need for training is very similar for captains and majors, with a decline in perceived need starting with lieutenant colonel.

Only one area outside of technical specialties and technology management showed a difference of more than .3 in perceived training needs. Counseling, which was grouped with interpersonal skills, showed a difference in perceived training needs when broken down by rank. Unlike the first five cases where the perceived need varied by

rank, this time the perceived need increased when looking at lieutenant colonels. The figure below shows the increase in perceived training needs.

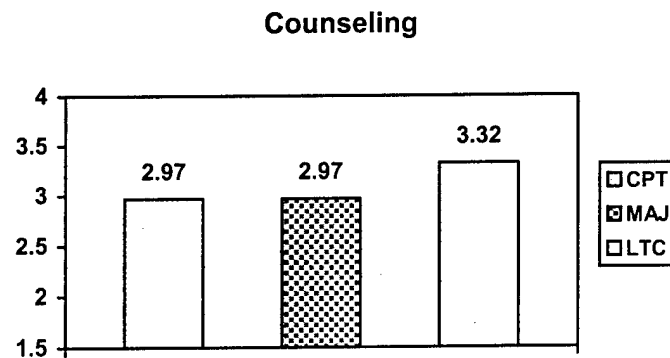


Figure 12. Perceived need for Counseling Training

This figure shows that captains and majors have exactly the same average perceived need for counseling, with a sharp increase when looking at the need based on the perceptions of lieutenant colonels.

Summary - Part VI

The highest perceived training need for Communications and Information officers is training on networks. This was followed very closely by information and system security. These two items were more than .15 higher than any other perceived training needs. While previous research (Schmidt, 1997; Phillips, 1998) shows that interpersonal skills are the most important skill set for information resource managers, the questionnaire responses reviewed in this section show that Communications and Information officers perceive training needs to be elsewhere. All of the training areas that averaged over 3.5, closer to significant need than moderate, were from groups other than interpersonal skills. Two came from technology management, two came from technical specialties, while the last came from information operations. The highest-

ranking interpersonal skill was written communication, listed at ninth with an average of 3.372. The training areas from each of the groups were distributed throughout the ordered list, with seven technical specialty areas being in the bottom nine. The other two in the bottom nine were two of the more technical technology management areas, corporate data architecture and “systems analysis and design/CASE methods and tools. Six areas showed a difference of more than .3 when broken down by rank, but only counseling showed a higher perceived need as officers progress through their career.

Part VII - Current Training/Continuing Education Assessment

This section of the questionnaire asked respondents to evaluate existing training. Respondents were asked to assess how well the current training/continuing education system had prepared them for the jobs they have been assigned as communications and information officers. The results of this question are shown in the figure below.

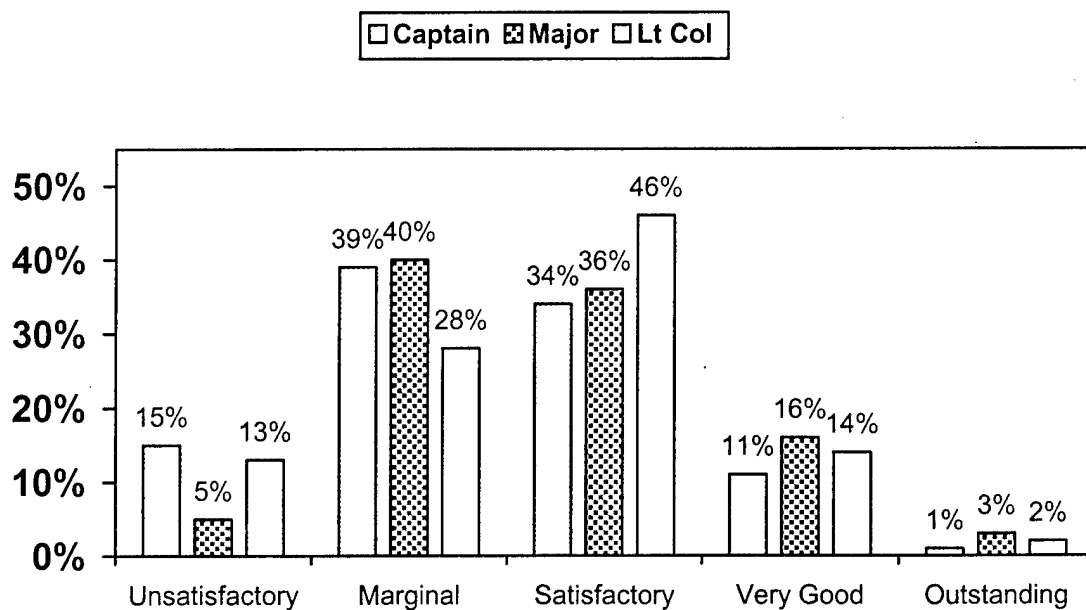


Figure 13. Evaluation of Current Training/Continuing Education System

It is apparent from the above data that the officers in the Communications and Information career field do not feel that the existing system is anything more than satisfactory, with over 40% of each rank rating it as merely unsatisfactory to marginal. This data cannot show what is wrong with the current system, but it certainly shows that the perception from Communications and Information officers in the ranks of captain through lieutenant colonel find the system to be less than desirable.

Summary - Part VII

While a significant number of respondents (53%) found the training and education system to be at least satisfactory, the remaining 47% rated it either unsatisfactory or marginal. These numbers suggest that strides can and should be made to improve C&I training across the career lifecycle, so that it provides what the Communications and Information officers in the field need to do their jobs in the most effective and efficient manner possible.

V - Conclusions, Recommendations, and Suggestions for Future Research

Introduction

Retention is becoming a problem in the Communications and Information officer career field (67% manning) at the same time the civilian sector is suffering from a labor shortage in information technology (IT) jobs. The current growing need for IT workers is expected to continue to increase in the coming years (Phillips, 1998:64). It is imperative that the Air Force receive maximum benefit from the IT professionals in this career field, since manning will probably be an ongoing problem. One of the ways in which the Air Force can increase the contribution of its IT workers is to maintain a high level of training in the career field.

Several AFIT theses have addressed training topics in this and related career fields. The last of these (Schmidt 1997; Phillips 1998) looked at the perceptions of officers and commanders as to those areas in which it is important to receive training, but did not pursue whether there was a training deficiency in these areas. While these studies focused on what areas of knowledge and training are important to information resource managers, this study investigated the current skill deficiencies specifically for Air Force Communications and Information officers.

This chapter will offer conclusions to the research by combining the research done in Chapter II with the results of the survey from Chapter IV. These data will be used to answer the investigative questions, as well as make recommendations regarding future Communications and Information officer career field training. Finally, suggestions will

be made for future research in the area of training and continuing education for officers in the career field.

Conclusions

Research Question 1. *“What training areas do Communications and Information officers feel are deficient within the current career field training system?”*

The first sign that training deficiencies exist is the fact that 48% of the respondents rated the current training as either marginal or unsatisfactory. As illustrated in Chapter IV, the participating officers perceived there to be moderate to significant need for additional training in 18 of the 29 topic areas in question. Six of the areas showed that respondents felt the need was closer to significant than it was to moderate. The training deficiencies occurred in several disparate subjects coming from all four of the subject area groups. Even though interpersonal skills were determined by Schmidt (1997) and Phillips (1998) to be the most important training skill set, four technology management subjects and three technical specialty subjects were considered to be needed more than training in any of the interpersonal skill subjects. This does not mean that they are not critical subject areas that must be kept up, it just means that they are not the areas that were considered to be most training deficient. The five interpersonal skills subjects areas were all clustered towards the middle between items 9 and 17. Several areas from technical specialties showed only a slight to moderate need for additional training. This could be due to the fact that several of these duties are primarily done by outsourcing in today's Air Force.

The significance of these results is that they will allow the career field managers to go beyond what subject areas are important, and determine what we are failing to train to an appropriate level. Knowing that a skill is necessary is not enough, it is critical to determine if training is required to overcome deficiencies in these given areas.

Research Question 2. *“If additional training is needed, at what point during a Communications and Information officer’s career would it be most appropriate to receive training in necessary areas?”*

Eighty-nine percent of the respondents felt that training was needed between the beginning course (BCOT) and the second course (ACOT) which officers take as senior captains and majors. The number of officers that perceived a need for additional training after ACOT were almost as significant at 85%. Sixty five percent of the respondents felt that training should be mandatory for Communications and Information officers.

The most frequent selection for when training should occur for given subjects was “beginning and recurring.” It is not possible to tell how much of this is due to the need to be refreshed in the different subject areas and how much of this is due to the need for updated knowledge due to the changes that rapidly occur in information technology. The most frequent response for each of the interpersonal skills was “beginning and recurring. The same was true for both of the Information Operations subject areas. Over half (8) of the subject areas in the group technical specialties showed a desire for Just-in-Time training. This could be attributed to the fact that these are skills that are not used at every job, and therefore it is better to wait until they become necessary to invest in the training. This also allows the knowledge to be as current as possible, and therefore more likely to aid in the completion of the job. The most frequent selection for the other four technical

specialties was “beginning and recurring”. Six of the technical management areas showed the highest frequency as “beginning and recurring”, three others had higher frequencies under the Just-in-time alternative. Corporate-wide information system/technology planning was the only subject area that had the highest frequency in the 4 to 8 year category. This marked the only one that was not either “beginning and recurring” or Just-in-Time.

Research Question 3. *“If additional training is needed, what is the best way to incorporate the additionally needed training into the training system that exists for communications and Information officers?”*

Since training was requested as either “beginning and recurring” or Just-in-Time for 28 of the 29 areas, and since the one area that is not in that category was not one of the ten most deficient training areas, the focus needs to be on these 28 courses and these to times for training. By introducing the 17 subject areas that need “beginning and recurring” at the Basic Communications and Information Officer Training (BCOT) school, we can reduce the entire problem to creating/acquiring Just-in-Time training for the 28 subject areas. Certain courses like programming languages could probably be satisfied by sending the few officers that need it to commercial training. The 11 courses whose response average was below “moderate need” (less than 3.0), are excellent candidates to just outsource. These are mostly technical courses with eight being from the group technical specialties and the other three being technology management. The only probable exception to this might be “Acquisition and Management”, but it could be performed by other agencies besides the Communications and Information career field. This training should be readily available through the Defense Acquisition University (see

Chapter II). The DoD is pushing the services to pursue distributed learning for as many courses as possible. The DoD's goal of "anytime/anywhere" training can compliment the need of the Communications and Information career field to offer Just-in-Time training in these areas. By pursuing Just-in-Time training, the Air Force's Communications and Information career field managers can solve the remaining training requirements once BCOT starts to satisfy all the beginning requirements. It is important to note that Just-in-Time training not only needs to be available, but also the officers in the field must be aware of its availability. The fact that 41% of the officers in the field were unaware of the existing computer based training shows a need for better information dissemination in the training area.

Recommendations

The recommendation made by Phillips (1998) for officers to "be proactive in gaining the skills needed in their careers" and take charge of their own careers by utilizing "self-taught methods and practice" (Phillips, 1998:68) will probably have no affect, since the officers who will take that approach already do. The onus lies squarely on the managers of the career field to create a training system that satisfies the needs of the officers in the field. The managers of the Communications and Information career field must create a training system that provides new and better training as the current system is often seen as deficient. A system must be in place that constantly monitors what training is needed by officers when they enter the career field, and also makes sure that the initial training supplies that training and education. A large majority of the respondents (86%) indicated they would be willing to incur an Active Duty Service

Commitment (ADSC) in exchange for training. This would ensure the Air Force does not lose money training people that are going to get out while also attacking the retention problem. With retention being such a big concern in the Air Force and the career field, a solution that provides badly needed training while increasing retention should get serious consideration by the career field's senior leadership.

The second area that the career field needs to address is Just-in-Time training that can be received through a distributed technology. The fact that all of the Air Force PME schools, except the elite School for Advanced Airpower Studies, provide distance learning, shows that Communications and Information officers are already exposed to this type of training. The military schools, National Defense University, Defense Acquisition University, and the Air Force Institute of Technology's Professional Continuing Education are already providing education and training utilizing these technologies. With every branch of the service being pushed to provide distributed learning, to train more people for less money, the time is right for the career field to position itself to satisfy some of its Just-in-Time training requirements by utilizing technology-enabled training.

Suggestions for Further Research

While this research examined which areas were perceived to need training it did not attempt to see if existing schools are attempting to satisfy those requirements. It is possible that someone who went through BCOT several years ago is completely unaware of what they teach today. It is also possible that BCOT still is failing to teach what is needed. Research into how well the existing schools (BCOT, ACOT, and AFIT), the

bridge courses offered by AFCA and the CBTs available from the base network control centers (NCC) are satisfying training needs is necessary. It is also important to find out what number of the career field members are actually aware of their training opportunities.

The second area this research looked at was when training should occur, but it did not pursue exactly how that training should be delivered. Research into which modalities are most appropriate for each of the training areas would be a great help to the career field as they try and decide which courses can utilize the various emerging technological training possibilities. Courses that members of the career field wanted to receive Just-in-Time could be easily delivered in that fashion using distributed learning techniques.

A third area that should be pursued with future research is whether accession criteria are relevant. In many career fields (e.g. Civil Engineering, Medical) officers are assessed only if they have a corresponding undergraduate degree. The Communications and Information career field has been forced, due to manning shortages, to assess individuals with degrees that have nothing to do with the communications or information technologies. This lack of background is quite possibly hindering the ability of the career field to train officers who enter with unrelated academic degrees.

A final area of research that would be of use to the career field is to determine if all of the attendees of BCOT need the same training. This is a viable question given that officers assess with various degrees and levels of experience. A large number of the officers in beginning training were previously enlisted in Communications and Information career fields. Money that is saved from not training individuals that do not need it could be redirected to train those who need it most.

Conclusion

This study was aimed at determining if training deficiencies existed for Communications and Information officers, even though they have received career field training. The data showed significant needs for additional training in several areas. There was no group of training areas that dominated the highest perceived needs; however, it is interesting to note that most of the lowest needs came from the technical specialties group. The overall assessment of training in the career field was that it is lacking, with only about half of the respondents finding it satisfactory or better.

The second goal was to determine when needed training courses should optimally occur within an officers career. Twenty-eight of the 29 courses were requested either “beginning and recurring” or Just-in-Time. This shows that these two training times should be the focus of the career field as the career managers look at improving training. To that end, the Air Force should closely explore how DL could be used to facilitate Just-in-Time training. Other training (e.g. PME) employ DL techniques to reach a “mass market” audience. The results of this study suggest that similar techniques might be appropriate from the perspective of career-long Communications and Information training as well.

Appendix A - Survey

AFIT/LA (Capt Little, email rex.little@afit.af.mil)

1 October 1999

Computer Training Survey – USAF SCN 99-79

Survey Participant

1. Please take the time to complete the attached questionnaire and return it in the enclosed envelope by 29 October 1999.
2. The survey measures your perception of when and how training should occur for a 33SX officer throughout his/her career. The collected data will be part of an AFIT research project and may influence curriculum decisions involving the training a 33SX officer receives during his/her career. My research sponsor is Colonel Dan Goad, presently assigned to AF/SCX; he will shortly assume duties as AETC/SC.
3. The results of this survey and my thesis will be provided to AF/SC, the 33SX 0-6 Steering Group, AETC/SC, 2nd AF/CC, 81st TRW/CC, 81st TRG/CC and the 333rd TRS/CC. These data will help the Air Force leadership determine professional development opportunities and potentially influence career assignments.
4. **Your individual responses will not be attributed to you personally. All data will be aggregated in the presentation. No individual will be identified to anyone outside the research team.**
5. The estimated time to complete the survey is 20 minutes. Your participation is completely voluntary, but I would certainly appreciate your help. For further information, please contact Captain Rex W. Little at email rex.little@afit.af.mil.

This survey is designed to gather important data on how best to obtain different types of training during a 33SX officer's career. The target group for the study is comprised of Air Force 33SX officers who have served in the Air Force for more than 4 years.

Part I – Demographic Data

**Please provide the following demographic information
by circling the appropriate response on the survey.**

1. What is your rank?

- (1) Captain
- (2) Major
- (3) Lt Colonel

2. How long have you been in the Air Force?

- (1) More than 4 years but less than 8 years
- (2) More than 8 years but less than 12 years
- (3) More than 12 years but less than 16 years
- (4) More than 16 years but less than 20 years
- (5) More than 20 years

3. How many years have you been a 33SX officer?

- (1) Less than 3 years
- (2) More than 3 years but less than 6 years
- (3) More than 6 years but less than 9 years
- (4) More than 9 years but less than 12 years
- (5) More than 12 years

4. Were you previously an Information Management (37AX) officer?

- (1) Yes
- (2) No

5. What is your highest educational level? Major?

- (1) Bachelor's degree _____
- (2) Master's degree _____
- (3) Doctoral degree _____

Part I – Demographic Data (continued)

**Please provide the following demographic information
by circling the appropriate response on the survey.**

6. Have you attended the Basic Communications Officer Training (BCOT) Course?

- (1) Yes
- (2) No

7. Have you attended the Advanced Communications Officer Training (ACOT) Course?

- (1) Yes
- (2) No

8. Are you a student or a graduate of an AFIT Master's program?

- (1) Yes
- (2) No

Part II - Definitions

Necessary Definitions

Computer Based Training (CBT) – Also called computer aided instruction (CAI) and interactive courseware (ICW). For the purpose of this survey this will be any course taken on a computer that does not have human interaction other than that of the student.

Web-based training – Web-based training has several definitions in current literature. The definition for this survey will be courses that are computer based, but allow some form of interaction (chat, email, VTC, etc.) with an instructor over the Internet.

Distance learning/education – Courses that involve students in a classroom viewing an instructor (not a recording) on a monitor. These classes allow real-time feedback with the instructor who also sees the students on a monitor. This is very similar to a video teleconference.

Part III - Training Background

**Please provide the following training background information
by circling the appropriate response on the survey.**

9. How many DoD (Air Force, Navy, DISA, etc.) CBTs have you taken?

- (1) none
- (2) 1-2
- (3) 3-5
- (4) 6 or more

10. How many commercial vendor (Oracle, Data General, etc.) CBTs have you taken?

- (1) none
- (2) 1-2
- (3) 3-5
- (4) 6 or more

11. How many distance learning, web-based, or VTC courses (DoD or commercial) have you taken?

- (1) none
- (2) 1-2
- (3) 3-5
- (4) 6 or more

12. How many commercial vendor (Learning Tree, Oracle, Solaris, etc.) provided classroom courses have you taken?

- (1) none
- (2) 1-2
- (3) 3-5
- (4) 6 or more

13. Since commissioning, how many DoD (Air Force, Navy, DISA, etc.) in-classroom courses have you taken? (Don't count BCOT, ACOT or PME)

- (1) none
- (2) 1-2
- (3) 3-5
- (4) 6 or more

Part IV – General Training Perceptions

**Please provide the following training perception information
by circling the appropriate response on the survey.**

14. Training/Continuing Education is necessary between BCOT & ACOT.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

15. Training/Continuing Education is necessary after ACOT.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

16. The personnel system should track all training 33SX officers have completed.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

17. Training/Continuing education should be mandatory.

- (1) Strongly Disagree
- (2) Disagree
- (3) Neither agree nor disagree
- (4) Agree
- (5) Strongly Agree

18. Would you be willing to assume an active duty service commitment (ADSC) in return for desired training/continuing education?

- (1) Yes
- (2) No

19. Are you aware that your base network control center (NCC) has computer based training available for Microsoft certification courses?

- (1) Yes
- (2) No

Part V When to receive training

**Using the scale provided, please indicate your general perception
of when it would be best to receive each type of training.**

SELECT BEST ANSWER

Beginning (BCOT) 1	Beginning & Recurring 2	first 4 years of career 3	4 – 8 years into career 4	> 8 years into career 5	As Needed - Just in Time 6	Never 7
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TECHNICAL SPECIALTIES

- 20. ___ Telecommunications (hardware, phones, modems, cables, satellites, etc)
- 21. ___ Networks (LAN, WAN, Corporate-wide, etc.)
- 22. ___ Relational Databases (Oracle, Sybase, etc.)
- 23. ___ Distributed Processing
- 24. ___ Software Engineering
- 25. ___ Programming Languages (Ada, C++, Java, Pearl, etc.)
- 26. ___ HTML & Web site building and management
- 27. ___ Decision Support Systems
- 28. ___ Expert Systems/Artificial Intelligence
- 29. ___ Operating Systems & OS tools (MVS, Solaris, NIS+, NT, System scripts, etc.)
- 30. ___ Military Applications (GCCS, GCSS, CTAPS, JWICS)
- 31. ___ Office Automation (E-mail, schedulers, etc)

TECHNOLOGY MANAGEMENT

- 32. ___ Systems Analysis and Design/CASE Methods and Tools
- 33. ___ Systems Life Cycle Management
- 34. ___ Project Management
- 35. ___ Information Management/Information Resource Management
- 36. ___ Emerging Technologies
- 37. ___ Corporate-wide information system/technology planning
- 38. ___ Information and system security
- 39. ___ Contingency planning/disaster recovery
- 40. ___ Corporate data architecture
- 41. ___ Acquisition and Contracting

INTERPERSONAL SKILLS

- 42. ___ Written Communication
- 43. ___ Oral Communication/Briefing Skills
- 44. ___ Working with/within teams
- 45. ___ Counseling
- 46. ___ Teaching/Instructing/Coaching

INFORMATION OPERATIONS

- 47. ___ Offensive (PSYOP, Deception, Hacking, etc.)
- 48. ___ Defensive (AFCERT, Barrier Reef, Info Assurance/Info Protection)

Part VI Need for additional training/continuing education

Using the scale provided, please indicate your general perception.
Based on **YOUR** experience as a 33SX officer, evaluate the need for **ADDITIONAL** training/continuing education (beyond BCOT and ACOT) in the following areas.

NOTE

SCALE DIFFERS FROM PREVIOUS PAGE - SELECT BEST ANSWER

No need
1

Slight need
2

Moderate need
3

Significant need
4

Critical need
5

TECHNICAL SPECIALTIES

- 49. ___ Telecommunications (hardware, phones, modems, cables, satellites, etc)
- 50. ___ Networks (LAN, WAN, Corporate-wide, etc.)
- 51. ___ Relational Databases (Oracle, Sybase, etc.)
- 52. ___ Distributed Processing
- 53. ___ Software Engineering
- 54. ___ Programming Languages (Ada, C++, Java, Pearl, etc.)
- 55. ___ HTML & Web site building and management
- 56. ___ Decision Support Systems
- 57. ___ Expert Systems/Artificial Intelligence
- 58. ___ Operating Systems & OS tools (MVS, Solaris, NIS+, NT, System scripts, etc.)
- 59. ___ Military Applications (GCCS, GCSS, CTAPS, JWICS)
- 60. ___ Office Automation (E-mail, schedulers, etc)

TECHNOLOGY MANAGEMENT

- 61. ___ Systems Analysis and Design/CASE Methods and Tools
- 62. ___ Systems Life Cycle Management
- 63. ___ Project Management
- 64. ___ Information Management/Information Resource Management
- 65. ___ Emerging Technologies
- 66. ___ Corporate-wide information system/technology planning
- 67. ___ Information and system security
- 68. ___ Contingency planning/disaster recovery
- 69. ___ Corporate data architecture
- 70. ___ Acquisition and Contracting

INTERPERSONAL SKILLS

- 71. ___ Written Communication
- 72. ___ Oral Communication/Briefing Skills
- 73. ___ Working with/within teams
- 74. ___ Counseling
- 75. ___ Teaching/Instructing/Coaching

INFORMATION OPERATIONS

- 76. ___ Offensive (PSYOP, Deception, Hacking, etc.)
- 77. ___ Defensive (AFCERT, Barrier Reef, Info Assurance/Info Protection)

10

- (1) Outstanding
- (2) Very Good
- (3) Satisfactory
- (4) Marginal
- (5) Unsatisfactory

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Attachment B. Response Rate Data

			CAPT	MAJ	LTC	
ANDREWS	AFB	MD	1	0	0	1
ARNOLD	AFB	TN	1	0	0	1
BROOKS	AFB	TX	1	0	0	1
DAVIS-MONTHAN	AFB	AZ	4	2	0	6
DENVER	CITY	CO	0	1	0	1
EDWARDS	AFB	CA	2	0	0	2
EGLIN	AFB	FL	8	1	2	11
ELMENDORF	AFB	AK	14	1	0	15
HANSCOM	AFB	MA	7	1	3	11
HICKAM	AFB	HI	22	5	5	32
HILL	AFB	UT	5	3	1	9
KELLY	AFB	TX	9	0	0	9
KIRTLAND	AFB	NM	4	7	2	13
LACKLAND	AFB	TX	3	0	0	3
LANGLEY	AFB	VA	23	12	11	46
LOS ANGELES	AFB	CA	2	2	2	6
MAXWELL	AFB	AL	13	13	8	34
MAXWELL - GUNTER ANNEX	AFB	AL	1	0	0	1
MCCLELLAN	AFB	CA	2	2	2	6
MCGUIRE	AFB	NJ	5	1	0	6
NELLIS	AFB	NV	4	0	0	4
OFFUTT	AFB	NE	12	10	8	30
PATRICK	AFB	FL	5	0	0	5
PENTAGON		DC	18	33	34	85
PETERSON	AFB	CO	8	14	8	30
RAMSTEIN	AB	GE	32	6	6	44
RANDOLPH	AFB	TX	16	5	6	27
RIYADH	AB	SA	2	1	0	3
ROBINS	AFB	GA	8	3	2	13
SAN ANTONIO	CITY	TX	0	2	0	2
SCOTT	AFB	IL	26	19	6	51
SHEPPARD	AFB	TX	2	0	1	3
TINKER	AFB	OK	10	3	5	18
TRAVIS	AFB	CA	1	1	0	2
TYNDALL	AFB	FL	4	4	2	10
USAF ACADEMY		CO	8	6	4	18
VANDENBERG	AFB	CA	4	1	0	5
WRIGHT-PATTERSON	AFB	OH	15	8	5	28
Total Sent			302	167	123	592
Rejections			18	20	11	49
			284	147	112	543
Population			1372	704	515	2591
Returns	2		121	80	59	262
Population Percentage			9%	11%	11%	10%
Return Percentage			43%	54%	53%	48%

Bibliography

- 333rd Training Squadron Synopsis, (2 October 1998)
<http://kee.aetc.af.mil/333trs/synopsis.htm>
- Advanced Communications and Information Officer Training Curriculum, (8 July 1999)
<http://www.keesler.af.mil/ACOT/acot/curr.htm>
- Advanced Communications and Information Officer Training Overview, (23 June 1999)
<http://www.keesler.af.mil/ACOT/acot/curr.htm>
- Air Command and Staff College Curriculum, (19 July 1999)
<http://www.au.af.mil/au/acsc/curriculum/curric5.htm>
- Air Command and Staff College Distance Learning Page, (15 July 1999)
<http://www.au.af.mil/au/acsc/distance/distance.htm>
- Air Command and Staff College History, (15 July 1999)
<http://www.au.af.mil/au/acsc/history.htm>
- Air Education and Training Command (AETC) Fact Sheet, (28 October 1999)
http://www.af.mil/news/factsheets/Air_Education_and_Training_Co.html
- Air Force Catalog 36-2223
- Air Force Issues Book, (Issue 31 1997)
<http://www.af.mil/lib/afissues/1997/issues31.html>
- Air Force Institute of Technology Degree Programs 98-99 Catalog
- Air Force Online News, (1 September 1999),
http://www.af.mil/newspaper/v1_n25/v1-n25_s2.htm
- Air Force Personnel Center (AFPC) Personnel Statistics Web Site, (30 September 1999),
<http://www.afpc.randolph.af.mil/demographics>
- Air War College AY 1999-2000 Catalog Fourth Edition, (29 January 1999)
<http://www.au.af.mil/au/awc/catalog.htm>
- Air War College Overview, (29 January 1999)
<http://www.au.af.mil/au/cat/awc.htm>
- Alden, Jay. "The NDU Knowledge Net For CIO's is Born!," Info Tech Talk: 1-2 (Spring 1999)

- Alreck, Pamela L., and Robert B. Settle. The Survey Research Handbook (Second Edition). Chicago IL: Richard D. Irwin, Inc., 1995.
- Basic Communications and Information Officer Training Curriculum (18 November 1999) <http://www.keesler.af.mil/ACOT/bcot/bcot-course.htm>
- Basic Communications and Information Officer Training Home Page (18 November 1999) <http://www.keesler.af.mil/ACOT/bcot/bcot.htm>
- Bethoney, Herb. "Spec unites Learning Systems," PC Week: 28-29 (27 June 1999).
- Biros, David P. and Stewart J. Cole. An Analysis of the Effectiveness of Air Force Information Management Officer Training Based on the Perceived Needs of Current Information Management Officers, MS Thesis, AFIT/GIR/LSC/92D-1. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, December 1992 (AD-A258138).
- Cole,-Gomolski, Barb. "Web Training Requires Different Educational Approach," Computerworld, (22 February 1999)
- Communications and Information Career Field Officer Professional Development Guide, 1999.
- Cooper, Donald R. and William C. Emory. Business Research Methods (Fifth Edition). Chicago IL: Richard D. Irwin, Inc., 1995.
- Davis, James R. "Reengineering Teaching for 21st Century Learning," Educational Record: 16-22 (Fall 1995).
- Davis, Stanley M. Managing Corporate Culture. New York: Harper & Row, 1984.
- Defense Acquisition University Technology-Based Education and Training Plan Concept Document Version 2.01, (5 June 1997).
- Defense Acquisition University Technology-Based Education and Training Plan Implementation Plan Version 2.01, (5 June 1997).
- Department of Defense. Strategic Plan for Advanced Distributed Learning. Report to the 106th Congress. Washington: GPO, 30 April 1999.
- DoD 5000.52-M Acquisition Career Development Program, (November 1995)
- Drucker, Peter F. Managing in a Time of Great Change, New York. Truman Talley Books/Dutton, 1995.

- Ehrmann, Stephen C. "Access and/or Quality? Redefining Choices in the Third Revolution," Educom Review: 41-43 (September/October 1999).
- Fogleman, Ronald R. Air Force Association National Symposium, Los Angeles, California, (18 October 1996).
- Fogleman, Ronald R. Air Power and Information, presentation at Aviation Week & Space Technology Executive Symposium on Information Management, (28 October 1996)
- Gates, Bill. The Road Ahead. New York, Viking Penguin, 1995
- Hammer, Michael and James Champy. Reengineering the Corporation. New York, Harper Business, 1993.
- Hammer, Michael and Steven A. Stanton. The Reengineering Revolution. New York, Harper Business, 1995.
- Haritos, George K. "AFIT responds to changing AF needs," Skywrighter: 8 (22 October 1999)
- HQ USAF/ACM. "A Guide for the Development of the Attitude and Opinion Survey," Pentagon, Washington DC. October 1974.
- Inman, Elliot, Michael Kerwin. "Instructor and Student Attitudes Toward Distance Learning," Community College Journal of Research & Practice, 12, 6: 581-591 (September 1999).
- Jaffee, David. "Institutionalized Resistance To Asynchronous Learning Networks," Journal of Asynchronous Learning Networks, 2: 1-11 (September 1998).
- Johnson, Dale A. "Training by Television," Training & Development Journal: 65-68 (August 1989).
- Kankey, Roland D., Jan R. Muczyk, Neal M. Ely. "Focused Graduate Education: An Invisible But Real Competitive Edge," Acquisition Review Quarterly: 367-382 (Fall 1997).
- Kemp, Jerrold E. and George W. Cochern. Planning for Effective Technical Training: A Guide for Instructors and Trainers. Englewood Cliffs, NJ: Educational Technology Publications., 1994
- Kasprzak, Jim. "Designing IRMC Distance Education Courses for our DoD Customers, Part I - Design Strategies," Info Tech Talk: 1-3 (Spring 1998)

- Kearns, David T. "David T. Kearns: a CEO's View of Training," Training & Development Journal: 41-50 (May 1990)
- Lawrence, Betty Hurley. "Teaching and Learning via Videoconference the Benefits of Cooperative Learning," Journal of Education Technology Systems, 24(2): 145-149 (1995-1996).
- Martin, James. "Evolution of a Species," Computerworld, 34: 37 (April 1995).
- Office of the President. Using Technology to Improve Training Opportunities for Federal Government Employees. Executive Order 13111. Washington: GPO, 12 January 1999.
- Phillips, Susan E. An Analysis of the Importance of Critical Skills as Perceived by Air Force Communications and Information Commanders, MS Thesis, AFIT/GIR/LAS/98S-11. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1998.
- Reform Through Learning - USD(A&T) Policy on Continuous Learning for the Defense Acquisition Workforce, (15 December 1998)
- Reinhardt, Andy. New Ways to Learn, Byte, (March 1995)
- Scafati, Anthony A. "A Case Study For the Systems Approach to Developing Curricula - Don't Throw the Baby Out with the Bath Water," Acquisitions Review Quarterly: 387-393 (Fall 1999).
- School of Advanced Airpower Studies Home Page, (17 February 1999)
<http://www.au.af.mil/au/saas/saas.htm>
- School of Advanced Airpower Studies Overview, (1 October 1998)
<http://www.au.af.mil/au/acsc/history.htm>
- Schmidt, Donald A. An Analysis of the Critical Skills, Training Sources, and Training Adequacy as Perceived by Air Force Communications and Information Officers, MS Thesis, AFIT/GIR/LAS/98S-11. School of Systems and Logistics, Air Force Institute of Technology (AU), Wright-Patterson AFB OH, September 1998.
- Scope Eagle Course Overview,
<http://www.keesler.af.mil/ACOT/scope/index.htm>
- Scope Warrior Curriculum, (25 October 1999)
<http://www.keesler.af.mil/ACOT/warrior/sw-xv-curr.htm>

Seidl, Major Holly. "Comm and Info Officer Training Issues Pre U&TW Work Report" (20 April 1998).

Shrestha, Govinda M., H. Dean Sutphin. "Program Delivery via Satellite in the Information Age: Extension Educators' Perspective on Teaching Techniques, Communication Channels, and Participation," Journal of Education Technology Systems, 24, 2: 135-144 (1995-1996).

Smith, Ray. "On The Line With Ray Smith," Educom Review: 12-15 (July/August 1994).

Software Professional Development Program Overview, 1-3 (July 1999)

Spooner, Fred, Luann Jordan, Bob Algozzine, Melba Spooner. "Student Ratings of Instruction in Distance Learning and On-Campus Classes," The Journal of Educational Research, 92, 3: 132-140 (January/February 1999).

Squadron Officer School Academic Credit Recommendation, (9 April 1998)
<http://www.au.af.mil/au/sos/soscredit.htm>

Squadron Officer School Non-Resident Curriculum, (29 January 1999)
<http://www.au.af.mil/au/sos/nonres.htm>

Squadron Officer School Resident Curriculum, (7 September 1999)
<http://www.au.af.mil/au/sos/resident.htm>

Stuart, Ann. "Continuing Ed," CIO Magazine Online, (1 September 1999)

Twigg, Carol A. "The Need for a National Learning Infrastructure," Educom Review: 17-20 (September/October 1994).

Varian, Hal R. "The Next-Generation Information Manager," Educom Review: 12-15 (January/February 1996).

Ward, David. "Technology and the Changing Boundaries of Higher Education," Educom Review: 23-27 (January/February 1994).

Vita

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13. ABSTRACT (Maximum 200 words) This study explores requirements for additional training Communications and Information officers. This research also looks at the best time to provide training/education in the identified training deficient areas. Training areas and categories were established by two previous theses and were modified by a group of field experts for this research. The following questions were posed in an effort to obtain the perception of officers in the field: (1) What training areas do Communications and information officers feel are deficient? (2) At what point during a Communications and Information officer's career would it be most appropriate to receive training in necessary areas? (3) What is the best way to incorporate additionally needed training into the existing training system? The results suggest that Air Force officers in this career field find the training to be satisfactory at best, with several training deficiencies in the multiple areas. The findings also show that officers would prefer to receive additional training either at the beginning of their career, or on a Just-in-Time/recurring basis. The results of this thesis show that improvements in training are necessary, and should emphasize both the beginning of an officer's career as well as Just-in-Time training that can be used "anytime/anywhere."				
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